FACULTY OF STOMATOLOGY

STUDY PROGRAM 0911.1 STOMATOLOGY

DEPARTAMENT OF PATHOLOGY

APPROVED
at the meeting of the Committee for Quality Assurance and Evaluation of the Curriculum faculty of Stomatology
Minutes No. 03 of 05.03.2025
Committee Prezident, Ph.D., Associate professor,
Zănoagă Oleg _____
(signature)

APPROVED
at the Council meeting of the Faculty of Stomatology
Minutes No. 05 of 04.03.2025
Dean of Faculty of Stomatology, PhD, associate professor
Mostovei Andrei _____
(signature)

APPROVED
at the meeting of the chair of Pathology
Minutes report nr. 6 from 01.03.2024
Head of chair PhD, associate professor
Melnic Eugen _____
(signature)

FACULTATEA DE STOMATOLOGIE

SYLLABUS

DISCIPLINE **PATHOPHYSIOLOGY**

Integrated studies

Type of course: **Compulsory**

Syllabus elaborated by authors:
Lutan Vasile, PhD, associate professor
Cobeț Valeriu, PhD professor

Chisinau, 2024

I. INTRODUCTION

- General presentation of the discipline: place and role of the discipline in the formation of the specific competences of the professional trening program. Pathological physiology (physiopathology) studies the vital activity of the sick organism – the functioning of cells, tissues, organs, organ systems in pathological conditions.
  Pathophysiology is a preclinical discipline that forms in future doctors/stomatologists a scientific view of the essence of the disease, defines typical pathological processes that constitute the basic elements of diseases ("alphabet" of medical pathology), forms elements of clinical thinking. The course of Pathophysiology exposes the general laws of etiology, pathogenesis, evolution and peculiarities of typical pathological processes that underlie dental and orofacial pathology, the general consequences for the organism of pathological processes localized in the oral cavity and pathological processes localized in other systems of the body that have consequences in the oral cavity.

- **Mission of the curriculum (aim) in professional training:**

Pathological physiology (pathophysiology) is a preclinical medical discipline, the study of which at the university stage pursues the following aims:

- aquisition of the methodology of the physiopathological experiment and ability to explain the information achieved in the experiment;
- knowledge of general laws of origin, appearance, evolution and end of typical pathological processes and nozological entities, which underlie dental and orofacial pathology;
- knowledge of functional disorders and biochemical imbalances at molecular, cellular, tissue, organ, system and body levels in typical pathological processes and diseases;
- general knowledge of pathological processes with localization in other systems of the body, which have repercussions in the organs of the oral cavity.
- knowledge of pathogenetic principles of correction of functional disorders and pathogenetic treatment of pathological processes and diseases;
- clinical interpretation of laboratory and paraclinical data of body systems.

- Language of the course: romanian, english, russian

- Beneficiaries: students of the III rd, faculty STOMATOLOGY.

II. MANAGEMENT OF THE DISCIPLINE

Course code	**F.05.O.051**
Name of course	**Pathophysiology**

Responsible (s) of discipline		**MELNIC Eugen M.D., DHMS, associate professor,** **Feghiu Iuliana, Ph.D., asist. professor** **C.Hangan, Ph.D.,DMS, associate professor**	
Year	**III**	Semester	**V**
Total hours including:			**90**
Course	**15**	Practical/laboratory classes	**15**
Seminars	**15**	Individual work	**45**
Form of assessment	**E**	Numbers of credits	**3**

III. TRAINING AIMS WITHIN THE DISCIPLINE

At the end of the discipline study the student will be able to:

- ***at the level of knowledge and understanding:***

– To know the rules of behavior with the laboratory animals, the methodology of the pathophysiological experiment and the interpretation of the information obtained in the experiment;
– To define the theoretical bases of general, special and clinical pathophysiology;
– To know the laws of origin, appearance, evolution and end of typical pathological processes;
– To know the laws of origin, appearance, evolution and end of typical pathological processes located in different organs and systems;
– To know the structural changes, biochemical imbalances and functional disorders at the molecular, cellular, tissue, organ, system and body levels in typical pathological processes and diseases;
– To know the principles of pathogenetic therapy of pathological processes and diseases.

- ***at the application level:***

– To be able to plan, organize and perform a physiopathological experiment;
– To be able to interpret the information obtained in the experiment;
– To be able to record physiological parameters of nervous, cardiac, external respiration, digestive system, kidney systems;
– To be able to perform the laboratory investigations used in the pathophysiological experiments (determination of erythrocyte count, leucocytes, leukogram, amount of hemoglobin, chromaticity index).

- ***at the integration level:***

– To interpret clinically hemograms, urograms, electrocardiograms, spiromograms, gastric and duodenal analysis, exudate and transudate analysis;
– To be able to analyze and interpret clinically the complex situation issues, including pathological processes and syndromes located in the organism systems;
– To be able to differentiate different pathological processes with similar clinical-morphological manifestations;
– To be able to formulate the principles of the etiotropic and pathogenetic therapy of various pathological processes.

IV. PROVISIONAL TERMS AND CONDITIONS

Student of the third year requires the following:

Studying and acquiring the discipline of pathophysiology requires the knowledge of the teaching language, confirmed skills in lyceum (biology, chemistry, physics), ability to communicate and team work, parallel study of preclinical disciplines general such as patomorphology, internal and surgical disease semiology, general pharmacology, ability to select and integrate achieved knowledge, applying of clinical thinking skills, pathogenetic analysis of diseases and principles of pathogenetic therapy. Good knowledge of the subject matter requires good knowledge of normal physiology, biochemistry, histology.

V. THEMES AND ESTIMATE DISTRIBUTION OF HOURS

Lectures, practical hours/ laboratory hours/seminars and self-trening

Nr. of/o	THEME	Hours		
		Lectures	Practical classes/ seminars	Individual work
1.	Object, tasks and methods of pathophysiology. Lesions of cytoplasmic membrane, mitochondria, lysosomes. Causes. Mechanisms. Consequences Cellular lessions. Necrosis. Apoptosis. Dystrophies.	**2**	**2**	**3**
2.	Disorders of regeneration. Atrophy. Hypertrophy. Hyperplasia. Metaplasia. Sclerosis.		**2**	**3**
3.	Disorders of local microcirculation. Arterial hyperaemia. Venous hyperemia. Stasis. Thrombosis. Embolism. Ischemia.		**2**	**3**
4.	Pathophysiology of the fluid-coagulating system. Hypo- and hypercoagulation.		**2**	**3**

Nr. of/o	THEME	Hours		
		Lectures	Practical classes/ seminars	Individual work
5.	Inflammation. Etiology. Pathogenesis. Biological significance. Fever. Etiology. Pathogenesis. Stages. Inflammatory process in the oral cavity organs	**2**	**4**	**6**
6.	Allergy. Allergic reactions type I, II, III, IV	**2**	**2**	**3**
7.	Pathophysiology of the metabolism and of hydro-electrolytic imbalance		**2**	**3**
8.	Pathophysiology of the central nervous system. Disorders of the sensitivity. Pain	**1**	**2**	**3**
9.	Pathophysiology of endocrine glands		**2**	**3**
10.	Pathophysiology of the RBC, WBC. Anemias.Leucocytosis.Leucosis.	**2**	**2**	**3**
11.	Pathophysiology of the cardiovascular system	**2**	**2**	**3**
12.	Pathophysiology of the respiratory system		**2**	**3**
13.	Pathophysiology of the digestive system. Pathophysiology of the liver. Hepatic failure.	**2**	**2**	**3**
14.	Pathophysiology of the kidneys. Renal failure	**2**	**2**	**3**
Total		**15**	**30**	**45**

1. OBJECTIVES AND CONTENT UNITS

Objectives	Content units
Theme (chapter) 1. Object, tasks and methods of pathophysiology. Lesions of cytoplasmic membrane, mitochondria, lysosomes. Causes. Mechanisms. Consequences Cellular lessions. Necrosis. Apoptosis. Dystrophies.	
• **To define:** the notions of reaction, process, pathological condition, disease, dental focal disease, the notions of etiology, general pathogenesis, notions of cellular injury, dystrophy, apoptosis, necrosis.	1. Nosology. Object of study. The tasks of pathophysiology. The pathophysiological experiment.

Objectives	Content units
• **To know**: the structure of the disease and its general characteristic, the differences between the cause of the disease and the condition of the disease, ways of generalizing of the local process, mechanisms which lead to the localization of the pathological process or disease, the mechanisms of cellular membrane lesions and their impact on cellular function. To know the mechanisms of cellular injury and their impact on organ and body functioning. • **To demonstrate:** role of the lesion in the mechanism of the disease, the cause-effect correlations, the vicious circle in the evolution of pathology or disease, the role of the main pathogenetic link in various diseases, the role of primary and secondary sanogenic mechanisms in the disease progression, significance of morbid process end, general thanatogenesis. To demonstrate the role of the main pathogenetic link in the evolution of the pathological process in functional disorders of mitochondria, lysosomes, nucleus, endoplasmatic reticulum, the role of cellular lesions in the mechanisms of dystrophy, necrosis, apoptosis, and sclerosis. • **To apply:** knowledge about specific and non-specific resistance of organs in the oral cavity in the evolution of oro-buccal pathologies, knowledge to other disciplines and to make conclusions, the consequences of cellular lesions for the estimation of pathological processes located in organs. To apply knowledge to other disciplines and to formulate conclusions. • **To integrate:** observations from experiments demonstrated in the form of a pathogenetic chain of pathological processes with interpretation of the observed phenomena. Local processes in apoptosis and necrosis with general changes in the body, cell death with local (inflammation) and general processes in the body (enzymes, hyperkalemia, acute phase reaction, fever, stress) in stomatological practice.	2. General etiology. Cause. Endogenous and exogenous condition. General pathogenesis. Lesion. Pathogenic factor. Cause-effect relationship. Pathogenic chain. Main pathogenic link. Vicious circle. 3. Sanogenesis. Reactivity. Adaptive, compensatory, protective, reparative reaction. 4. Cell dystrophy 5. Apoptosis. Stages of apoptosis: initiation, execution, final. Intrinsic and extrinsic apoptosis 6. Necrosis, necrobiosis, tanatogenic factors.

Objectives	Content units
Theme (chapter) 2. Disorders of regeneration. Atrophy. Hypertrophy. Hyperplasia. Metaplasia. Sclerosis.	
• **To define:** The concepts of cellular dedifferentiation, physiologic regeneration and pathologic regeneration, functional, adaptive, reparative, protective, compensatory hyperplasia and hypertrophy, fibrosis and sclerosis, metaplasia and dysplasia, homeostatic, adaptive, reparative, protective, compensatory regeneration. Pathologic and physiologic hypofunctional, involutional, senile, endocrine, posthypertrophic atrophy. Labile, stable, progressive sclerosis. Collagenogenesis. Collagenolysis. • **To know:** Causes, pathogenesis and role in pathology of cell dedifferentiation. Mechanisms of physiological regeneration: homeostatic, adaptive, reparative, protective, compensatory. Mechanisms of pathologic regeneration. Mechanisms of functional, adaptive, reparative, protective, compensatory hypertrophy. Mechanisms of physiologic atrophy: hypofunctional, involutional, senile, endocrine, posthypertrophic. Mechanisms of pathologic atrophy. Causes, pathogenesis, consequences of sclerotization. Principles of pathogenetic correction of sclerotic process. • **To demonstrate** the role of the main pathogenetic link in the evolution of the tissue pathological process, the differences between hyperplasia and organ hypertrophy, pathogenetic variants of the sclerosis development • **To apply** the particularities of the regenerative process in the oral cavity organs in the evolution of the dental pulp affection, the periodontal, knowledge for the reasoning of pathogenetic treatment, knowledge to other disciplines. • **To integrate:** theoretical information about the pathogenesis of typical cellular pathologic processes in disease pathogenesis.	1. Physiologic and pathologic regeneration. 2. Physiologic and pathologic hyperplasia and hypertrophy. 3. Physiologic and pathologic atrophy. 4. Pathologic regeneration. Metaplasia and dysplasia 5. Sclerosis. Collagenogenesis. Collagenolysis
Theme (chapter) 3. Disorders of local microcirculation. Arterial hyperaemia. Venous hyperemia. Stasis. Thrombosis. Embolism. Ischemia.	

Objectives	Content units
• **To define:** the notions of arterial hyperemia, venous hyperemia, ischemia, blood stasis, embolism, thrombosis, inflammation, allergy, autoallergy, pseudoallergy, anaphylactic shock. • **To know:** the pathogenetic mechanisms of arterial hypertension, venous ischaemia, blood stasis, embolism, thrombosis, inflammation, allergy, autoallergy, pseudoallergy, anaphylactic shock and their impact on organ function, including those in the oral cavity. • **To demonstrate** the principles of pathogenetic treatment for arterial and venous hyperemia, ischemia, blood stasis, embolism, thrombosis, inflammation, allergy, anaphylactic shock, autoelegia, pseudoallergy, the features of arterial and venous hyperaemia, ischemia, blood stasis, embolism, thrombosis, inflammation, allergy, autoallergy, pseudoallergy in the organs of the oral cavity, the consequences of inflammation, allergy, autoallergy, pseudoallergy in the organs of the oral cavity on the whole body. • **To apply** the effects of biologically active substances in estimating disorders in the oral cavity organs. To apply the morphological and functional particularities of the oral cavity organs in the evolution of the dental pulp affection, the paradonitis within the inflammation, the drug allergy, the autoallergy. To apply the knowledge to other specialized disciplines. • **To integrate** pathogenetic mechanisms of arterial and venous hyperemia, ischaemia, blood stasis, embolism, thrombosis, inflammation, allergy, autoallergy, pseudo-allergy, anaphylactic shock with the functional, structural features of the organs in the oral cavity.	1. Arterial hyperemia neurotonic, neuroparalytic, neuroparalytic, neuromyelomatoparalytic, humoral, functional reactive. 2. Ischemia. Embolism, types. 3. Obstructive, obliterating, compressional local venous hyperemia. Prestage and stasis. 4. Mechanism of thrombogenesis. White thrombus and red thrombus formation. 5. Edema. Hypooncotic, hyperosmotic, hydrostatic, membranogenic and lympho-static mechanisms of edema formation.
Theme (chapter) 4. Pathophysiology of the fluid-coagulating system. Hypo- and hypercoagulation.	

Objectives	Content units
• **To define** the notion of hemostasis, thrombosis, hypocoagulation, hemorrhagic syndrome. • **To know** the characteristics of primary and secondary hemostasis, the causes and mechanisms of thrombosis, hypocoagulation, hemorrhagic syndromes and their consequences for whole body, how to differentiate the hemorrhagic syndrome according to changes in the hemogram and/or biochemical blood analysis. • **To demonstrate** the correlations between diseases in the mouth and teeth and changes in the status of fluido-coagulant balance, the differentiation of thrombocytopenia and thrombocytopathy, the differentiation of different types of coagulopathies, role of anti-coagulant and fibrinolytic syndrome in pathogeny of hemorrhagic syndromes, the pathological changes in the organs of the mouth in hemorrhagic syndromes, risks of hypo- and hypercoagulation syndromes with odontogen origin in development of whole body dyshomeostasis, the principles of pathogenetic treatment in hypocoagulation and hypercoagulation syndromes. • **To apply:** the pathogeny of hypercoagulation and hypocoagulation for understanding the changes in the organs of the mouth (local immune protection, dystrophy of periodontal structures, local inflammation, mucosal necrosis), the knowledge in understanding the diseases of the mouth in the context of other clinical fields. • **To integrate**: theoretical information about the disorders of the fluid-coagulant system in the pathogenesis and evolution of different pathologies in the oral cavity and in the whole organism.	1. Fluid-coagulant balance 2. Hypercoagulability process 3. Hypocoagulability process 4. Hemorrhages
Theme (chapter) 5. Inflammation. Etiology. Pathogenesis. Biological significance. Fever. Etiology. Pathogenesis. Stages. Inflammatory process in the oral cavity organs.	

Objectives	Content units
• **To define** the notions: inflammation, alteration, cellular and humoral proinflammatory mediators, vascular reactions, leukocyte emigration, phagocytosis, inflammatory proliferation, post-inflammatory regeneration. The acute phase reaction. Fever. Leukocytosis. • **To know** the causes of inflammation, pathogenesis of alteration caused by various phlogogenic factors, source of cellular and humoral mediators, effects of mediators, pathogenesis of vascular reactions in inflammatory focus, pathogenesis of exudation and composition of different forms of exudate, mechanisms and role of leukocyte emigration in inflammatory focus, mechanisms of post-inflammatory regeneration. General changes in the body in local inflammation: reaction of the acute phase, fever, leukocytosis. • **To demonstrate** the pathogenetic chain of various forms of inflammation: alterative, exudative, proliferative. Demonstrate the pathogenetic chain of systemic inflammatory reaction. • **To apply:** general changes in the body for diagnosis and monitoring of the inflammatory process. Apply information about the pathogenesis of inflammation to modulate the inflammatory process and use anti-inflammatory preparations in dental practice. • **To integrate** information about the etiology, pathogenesis and manifestations of inflammation in the pathogenesis and evolution of inflammatory diseases in the oral cavity.	1. Inflammation. Alteration. Cellular and humoral proinflammatory mediators. 2. Vascular reactions in the inflammatory focus. Arterial hyperemia, inflammatory venous hyperemia, ischemia, ischemia, prestathesis, stasis, thrombosis. 3. Exudation. Exudate serous, fibrinous, purulent, hemorrhagic, putrid. 4. Leukocyte emigration. Phagocytosis. Proliferation. Regeneration. Acute phase reaction. Fever. Leukocytosis.
Theme (chapter) 6. Allergy. Allergic reactions type I, II, III, IV	
• **To define** the notions of allergy, immediate type allergic reactions: anaphylactic, cytolytic, with circulating immune complexes; delayed allergic reactions, active and passive sensitization, pseudoallergy, anaphylactic shock, autoimmunity,	1. Allergy. Immediate-type allergic reactions: anaphylactic, citolytic, immune complex. Anaphylactic shock.

Objectives	Content units
autoantigen, autoantibody, humoral, cellular and mixed immunodeficiency. • **To know** the etiology and pathogenesis of the immunological phase characterised by antibody synthesis or lymphocyte sensitization, pathogenesis of the pathochemical phase, sources of cellular and humoral mediators, main mediators and biological effects. To know the impact of allergy, pseudoallergy, anaphylactic shock and immunodeficiencies of humoral and cellular type on the functioning of organs, including those in the oral cavity. • **To demonstrate** principles of pathogenetic treatment for allergy, anaphylactic shock, pseudoallergy, humoral, cellular and mixed immunodeficiencies. • **To apply:** the effects of biologically active substances in estimating changes in the oral organs. Apply morphological and functional peculiarities from oral cavity organs in the evolution of dental pulp disease, periodontium in drug allergy, humoral and cellular immunodeficiencies. Apply knowledge to other specialist disciplines and draw conclusions. • **To integrate** the pathogenetic mechanisms of allergy, autoallergy, pseudoallergy, anaphylactic shock with the functional and structural peculiarities of the organs in the oral cavity.	2. Delayed-type allergic reactions 3. Autoimmunity, autoantigen, autoantibody. 4. Immunodeficiencies of humoral, cellular and mixed type. 5. Non-specific hypersensitivity.
Theme (chapter) 7. Pathophysiology of the metabolism and of hydro-electrolytic imbalance	
• **To define:** the notions of metabolic imbalances, hyperglycemia, hypoglycemia, hypoproteinemia, hyperlipidemia, hyper-, hyponatremia, hyper-, hypocalcaemia, hyper-, hypokalaemia, hypophosphataemia, fluorosis, dehydration, acidosis, alkalosis. • **To know:** the types, the pathogenetic mechanisms and compensatory reactions of of hyperglycemia,	1. Carbohydrate dysmetabolisms, hyperglycemia and hypoglycemia, ketonemia, hyperosmolar and ketoacidotic hypoglycemic coma

Objectives	Content units
hypoglycemia, hypoproteinemia, hyperlipidemia hyper-, hyponatremia, hyper-, hypocalcemia, hyper-, hypokalaemia, hypophosphataemia, fluorosis, dehydration, acidosis, alkalosis, hypoxia, hyperthermia, fever. • **To demonstrate:** the impact of hyperglycemia, hypoglycemia, hypoproteinemia, hyperlipidemia, hyper-and hyponatremia, hyper-and hypokalemia, hyper-and hypercalcemia, hyperphosphatemia, fluorosis, acidosis, alkalosis, hypoxia, hyperthermia, fever on organs of the mouth; the correlation between protein, carbohydrate, lipid, hydroelectrolytic, acid-base disturbances, hypoxia and the functional and structural status of mouth structures; the principles of pathogenetic treatment of these processes. To demonstrate the metabolic role of fluoride in the teeth tissue. • **To apply:** the pathogeny of hyperglycemia, hypoglycemia, hypoproteinemia, hyperlipidemia, hyper-and hyponatremia, hyper-and hypokalemia, hyper-and hypercalcemia, hyperphosphatemia, fluorosis, acidosis, alkalosis, hypoxia, hyperthermia, fever in evaluation of the changes in the organs of the mouth on organs of the mouth. • **To integrate** the pathogenetic mechanisms of hyperglycemia, hypoglycemia, hypoproteinemia, hyperlipidemia, hyper-and hyponatremia, hyper-and hypokalemia, hyper-and hypercalcemia, hyperphosphatemia, fluorosis, acidosis, alkalosis, hypoxia, hyperthermia, fever with functional and structural features of organs of the mouth.	2. Congenital and acquired lipid dysmetabolisms. Transport, retention, dietary hyperlipidemia. Hyperlipoproteinemia. Hypercholesterolemia. Atheromatosis 3. protein dysmetabolisms. Hypoproteinemia. Hyperproteinemia 4. Hyper- and hyponatriemia. 5. Hyper- and hypokalemia. 6. Hyper- and hypocalcemia. 7. Hyper- and hypochloremia. Hyper- and hypophosphatemia 8. Acidosis. Alkalosis
Theme (chapter) 8. Physiopathology of central nervous system. The pain.	
• **To define** the definitions of excitability, sensibility, pain, oro-facial pain.	1. Neuronal excitability disorders. Hyperexcitability. Hypoexcitability. Depolarizing inhibition

Objectives	Content units
• **To know** the conductor pathways for different type o sensibility and pain, the pathogenetic mechanisms of sensibility disturbances, pain and oro-facial pain. • **To differentiate** different types of sensibility and pain, inclusive the pathological types, the trigeminal pain, temporo-mandibular pain, mio-fascial pain. • **To demonstrate** the impact of pain on the body, the role of oro-facial pain in the pathological processes in the mouth, the correlation between different sensibility disturbances and functional and structural features of the organs of the mouth. To demonstrate the principles of pathogenetic treatment for trigeminal, temporo-mandibular and mio-fascial pain. • **To apply** the pathogeny of trigeminal pain, temporo-mandibular pain, mio-fascial pain in understanding the changes in the organs of the mouth and make conclusions regarding the impact of trigeminal, temporo-mandibular and mio-fascial pain on organs of the mouth and the whole body. • **To integrate** the knowledge in understanding the diseases of the mouth in the context of other clinical fields.	2. Sympathetic and parasympathetic vegetative disturbances. Vegetative reflex arc. 3. Types of sensory disturbances: Hyperesthesia. Hypoesthesia. Anesthesia. Hypoalgesia. Hyperalgesia. Paresthesia *4.* Trigeminal, temporomandibular, myofascial pain
Theme (chapter) 9. Physiopathology of endocrine system	
• **To define** the notions of hyperfunction and hypofunction of endocrine glands; primary, secondary and tertiary endocrine disturbances • **To knows** the principles of organisation of endocrine system (trans-pituitary and para-pituitary pathways) To knows the mechanisms of endocrine system auto regulation, different types of hyperaldosteronism, hypo- and hypercorticosolism, hypo- and-hyperthyroidism, insulin deficiency. To know the effects of tropic hormones, vasopressin, ACTH, cortisol,	1. Hiper- şi hiposecreţie de somatoliberină-somatotropină-somatomedină. 2. Hiper- şi hiposecreţie de corticoliberină-corticotropină. Hiper- şi hipocorticism.

Objectives	Content units
thyroid hormones and insulin on the body tissues and on the organs of the mouth. • **To demonstrate** the role of somatotropin in development of diseases of the facial bones and teeth. To demonstrate the role of insulin deficiency in development of body disturbances and disease of the periodontal structures., the hormonal changes in the blood in primary, secondary and tertiary endocrine disturbances of adrenal glands, thyroid gland, sexual glands. • **To apply** the pathogeny insulin deficiency in estimation of changes at the level of the mouth (epithelial hyporegeneration, local immunodeficiency, dystrophy of paradont, local acidosis) and for formulation of conclusions regarding the impact of insulin deficiency, hypercortisolism, excessive somatotropin on the organs of the mouth. • **To integrate** the knowledge in understanding the diseases of the mouth in the context of other clinical fields.	3. Hiper- şi hiposecreţie de tiroliberină-tirotrotropină. Hiper- şi hipotiroidism. 4. Hipo- şi hiperinsulinism 5. Hiperaldosteronism primar şi secundar.
Theme (chapter) 10. Physiopathology of the blood, RBS and WBC. Erythrocytosis. Anemias. Leucocytosis. Leucosis.	
• **To define** the notion of hypo- and hypervolemia, anemia, erythrocytopenia, erythremia, leucocytosis, leucopenia, leukaemia. • **To know** the types and characteristics of hypo- and hypervolemia and to differentiate them on blood analysis, the pathogenetic classification of anemias. how to differentiate the notion of erythrocyte hypochromia and hyperchromia, microcytosis, macrocytosis, hyper – and hyporegeneration of erythroblast series. To know how to differentiate iron deficiency anemia, B_{12} vitamin deficiency and folate deficiency anemia, haemolytic anemias, acute and chronic post-bleeding anemia in the blood analysis. To	1. Primary and secondary, absolute and relative erythrocytosis. 2. Iron deficiency anemia 3. B12 deficient and folic acid deficient anemia. 4. Acute and chronic posthemorrhagic anemias.

Objectives	Content units
know the causes and general mechanisms of leucocytosis, leukopenia and leucosis. • **To demonstrate** the pathogenetic chains within iron deficiency anemia, B_{12} vitamin deficiency and folate deficiency anemia, haemolytic anemias, acute and chronic post-bleeding anemias and their impact on whole body and organs of the mouth. To demonstrate the correlations between diseases of the mouth and diseases of the blood. To demonstrate the role of leucocytes in maintenance of oral cavity homeostasis. To demonstrate the pathogenetic principles of treatment in anemia, leucocytosis and leukosis, the changes in blood analysis in the treatment of inflammatory disorders, leucosis. • **To apply** the pathogenetic mechanisms of leucocytosis and leucosis for understanding the changes at the level of the organs of the mouth (local immunodeficiency, dystrophy of periodontal structures, inflammation, mucosal necrosis), for formulation of conclusions regarding changes in the blood analysis and their impact on the functional and structural homeostasis of the organs of the mouth. • **To integrate** the knowledge in understanding the diseases of the mouth in the context of other clinical fields.	5. Congenital, acquired hemolytic anemias 6. Absolute and relative leukocytosis. Neutrophil leukocytosis. Eosinophilic leukocytosis. Basophilic leukocytosis. 7. Lymphocytosis and monocytosis. 8. Absolute and relative leukopenia, neutropenia, eosinopenia, agranulocytosis, lymphocytopenia. 9. Hemoblasts. Acute and chronic leukemias, lymphomas. Etiology. Pathogenesis. Hematologic picture.
Theme (chapter) 11. Physiopathology of the cardiovascular system	
• **To define:** notion of circulatory insufficiency, heart failure, coronary insufficiency, vascular insufficiency, arterial hypertension, sinus tachycardia and sinus bradycardia, extrasystole. • **To know** the causes and pathogenetic mechanisms, compensatory reactions involved in heart failure, how to differentiate the heterometric heart hyperfunction	1. Cardiogenic circulatory insufficiency, non-coronary cardiogenic, coronary, metabolic, hematogenous. Vasogenic circulatory insufficiency.

Objectives	Content units
and homeometric heart hyperfunction, how to differentiate on ECG sinus heart arrhythmias, atrial and ventricular extrasystole, myocardial ischemia, myocardial necrosis, primary arterial hypertension from secondary arterial hypertension. To know • **To demonstrate:** the pathogenetic mechanisms of acute vascular failure, collapse. To know the principles of pathogenetic treatment in heart and vascular disorders, the changes of hemodynamic parameters in cardiovascular failure. • **To apply** theoretical knowledge of the pathogenesis of cardiovascular pathology in dental practice. • **To integrate**: theoretical information about cardiovascular system disorders in oro-maxillofacial pathologies.	2. Primary and secondary arterial hypertension. 3. Chronic and acute arterial hypotension: collapse, shock 4. Cardiac arrhythmias: Sinus tachycardia and bradycardia. Extrasystoles, atrial and ventricular flutter, atrial and ventricular fibrillation. Incomplete and complete atrioventricular block
Theme (chapter) 12. Pathophysiology of the respiratory system	
• **To define** the notion of external respiratory failure the concept of dyspnea, asphyxia, the concepts of pulmonary restriction, pulmonary obstruction. • **To know** the arterial blood gas pressure in norm and respiratory diseases. To know the changes of lung volumes and lung capacities in obstructive lung disease and restrictive lung disease. To know the types of dyspnea and asphyxia, the causes and the mechanisms of development, the changes on spirometry, how to differentiate the notion of pulmonary restriction and pulmonary obstruction. • **To demonstrate** the role of oral pathology in pathogenesis of lung obstruction disorders. To demonstrate the principles of pathogenetic treatment in pulmonary fibrosis, lung atelectasis, pulmonary edema, bronchial asthma. • **To apply** the knowledge for explanation of pathogenetic mechanism of pulmonary fibrosis, lung atelectasis, pulmonary edema, bronchial asthma.	1. Pathophysiology of external respiration. Restrictive ventilatory disorders. 2. Obstructive ventilatory disorders. Upper airway obstruction. 3. Alveolo-capillary gas diffusion disorders. Lung perfusion disorders. 4. Gas transportation disorders: oxygen and carbon dioxide.

Objectives	Content units
• **To integrate** the knowledge in understanding the diseases of the mouth in the context of other clinical fields.	
Theme (chapter) 13. Pathophysiology of the digestive system and liver .	
• **To define** the concepts of dental caries, periodontosis, periodontitis, hypo-, hypersalivation, hyper-, xerostomia, gastric hyposecretion, stomach hyperacidity, ulcerogenesis, maldigestion, malabsorption, liver failure, jaundice, mechanisms and manifestations of cholemia and acolytic syndrome. • **To know** the causes and the mechanisms of pathological processes from the oral cavity: dental caries, paradontosis, hypo- and hypersalivation, disturbance of mastication and deglutition, the role of macroorganisms, of local immune system, of saliva, of masticatory muscles in the pathogenesis of dental caries, paradontosis, pulpitis and dysphagia (difficulty swelling), the disturbances of gastric and duodenal digestion in dental disorders, role of masticatory muscles in the pathogenesis of gastric and duodenal disorders, the consequences of oral cavity's disorders on the organs of gastrointestinal tract, the role of pancreas in digestion processes. • **To demonstrate:** pathogenetic treatment principles in periodontitis, paradontosis, dental caries, stomach hyperacidity, ulcerogenesis, pancreatitis, jaundice, liver failure, stomach and duodenal digestion disorders in dental diseases, role of masticatory muscles in the mechanisms of gastric and duodenal diseases, the consequences of disorders of the organs of the oral cavity on the organs of the digestive tract, the role of the pancreas in digestion, disorders of duodenal digestion, pathogenesis of meteorism and gastrointestinal autointoxication, correlation between	1. Salivation disorders. Hypo-hypersalivation. Dental caries - pathologic process, 2. Pancreatic secretory disorders. Acute and chronic pancreatic insufficiency. 3. Disorders of secretion, motility and evacuation of food bolus from the stomach. Gastric and duodenal ulcerogenesis. 4. Bile secretory disorders. Acholia. 5. Digestive disorders of the small and large intestine

Objectives	Content units
the pathology of the gastrointestinal tract and the state of the oral cavity. To demonstrate the role of the liver in digestion, metabolic disorders, hemostasis, in liver failure, the differences between specific functions of the liver and their importance for the state of the oral cavity organs, hemorrhagic syndrome in the oral cavity organs in liver failure. To demonstrate the biochemical analysis of blood in diseases of the digestive tract, types of jaundice after biochemical analysis of blood, urine • **To apply:** theoretical knowledge in the interpretation of clinical manifestations and laboratory investigations of digestive disorders. • **To integrate:** theoretical knowledge of digestive disorders in the oral cavity.	6. Liver failure. Etiology, pathogenesis, manifestations and consequences. Liver cirrhosis. Hepatic coma. Etiology, pathogenesis, manifestations and consequences 7. Jaundices. Prehepatic, parenchymal and posthepatic jaundice. Etiology, pathogenesis, manifestations and consequences
Theme (chapter) 14. Pathophysiology of the kidney	
• **To define** the notion of glomerulonephritis, nephritic syndrome, nephrolytiasis, pielonephritis, uretritis and cystitis. • **To know** the causes and pathogenetical mechanisms of filtration disturbances, of abnormal reabsorbtion and secretion, concentration and dilution of the urine, and disturbance of urinary elimination, phospho–calcium metabolic disturbance at the level of the kidney, the role of rennin-angiotensin system, of erythropoietin and of prostaglandin in homeostasis of the body. • **To demonstrate:** mechanisms of hematuria, proteinuria, glucosuria, leucocyturia, hypo – and hypersthenuria, mechanisms of oliguria, anuria and polyuria, general analyzes of urine (quantitative changes of the urine), correlation between abnormal renal function and affection of periodontal disease, the	1. Prerenal, intrarenal and subrenal glomerular filtration disorders. 2. Tubular reabsorption disorders. 3. Tubular secretory disorders. 4. Prerenal, intrarenal and subrenal renal failure. Acute and chronic renal failure.

Objectives	Content units
principles of pathogenetic treatment in glomerunephritis, pielonephritis, uretritis and cystitis. • **To apply:** the knowledge to estimate the correlations between kidney function disorders and periodontal diseases. • **To integrate**: Theoretical knowledge in the pathogenesis of nosologic entities: nephritis, nephrotic syndrome, renal failure, nephrolithiasis.	**5.** Nephritic and nephrotic syndrome.

VII. PROFESSIONAL (SPECIFIC (SC)) AND TRANSVERSAL (TC) COMPETENCES AND STUDY OUTCOMES

✓ **Professional (specific) (SC) competences:**

CP1. Responsible performance of professional tasks with the application of the values and rules of professional ethics, as well as the provisions of the legislation in force.
CP2. Adequate knowledge of the sciences about the structure of the organism, physiological functions and behavior of the human organism in various physiological and pathological states, as well as the relationships between the state of health, the physical and social environment.
CP5. Interdisciplinary integration of the physician's work in a team with efficient use of all resources.
CP6. Conducting scientific research in health and other branches of science.
CP7. Promoting and ensuring the prestige of the medical profession and raising professional standards.

✓ **Transversal competences (TC)**

CT1. Autonomy and responsibility in activity.

✓ **Study findings**

Note. Study findings (are deduced from the professional competencies and formative valences of the informational content of the discipline).

VIII. STUDENT SELF – TREINING

No.	Expected product	Achievement strategies	Evaluation criteria	Deadline
1.	Working with textbooks	Studying the material from the recommended manuals. Summary the material in the form of postulates. Exposing the material in the form of improvised schemes. Marking the questions that require special consultation	The ability to reproduce the main notions and the content of the material; the ability to give the essence of material; Ability to expose the material in logical schemes; Ability to explain the material; Ability to answer control questions;	During whole semester
2.	Working with the materials of theoretical course	Studying the material of theoretical course; Studying the presentations of theoretical course; Summary of material in the form of postulates;	Ability to supplement the manual material with the information form theoretical course; Ability to reproduce textually and to interpret presentations of the theoretical course;	During whole semester
3.	Working with the compendium of practical lessons	Studying the planned experiments for demonstration at the practical lesson: the experiment methodology, the obtained results and their interpretation.	Ability to integrate experiments into structure of the theoretical theme; The integration of experimental data in studied pathological processes; The illustration of the topic with real material; Explanation of experimental results with theoretical information; Translocation of the experiment into medical practice;	During whole semester
4.	Working with the situational problem recommended for the theme	Studying and solving of situational problems	The ability to answer correctly to the questions of the problems; The ability to interpret the pathogenetic summary of clinical, paraclinical, and laboratory information; The ability to make conclusions; Ability to make decisions about diagnosis, therapy and prognosis;	During whole semester
5.	Working with the collection of	Studying and solving control tests of the subject;	Monitoring the cognitive process by autocontrol	During whole semester

	tests in pathophysiology	Self-control of material acquisition using the control questions		
6.	Working with online materials	Studying materials on-line from the Department SITE; Working with encyclopaedic materials, dictionaries, scientific activities; Selection of the research theme, purpose, selection of materials, formulation of conclusions, bibliography.	Supplementing informations with recent materials	During whole semester
7.	Preparation and support of papers, presentations	Selection of research topic, purpose, selection of materials, formulation of conclusions, bibliography.	Workload	During whole semester

IX. METHODOLOGICAL SUGGESTIONS FOR TEACHING –LEARNING - ASSESSMENT

Teaching and learning methods used

- The discipline pathophysiology and clinical pathophysiology is teaching by using different methods and didactic procedures, orientated toward efficient learning and to achievement of processes didactic objectives. During the theoretical course along with traditional methods (course exposition, interactive course, synthesis course), also are used clinical cases. During the practical lessons are used different types of individual evaluation, direct, in-group, laboratory works with estimation of didactic videos. For deeper understanding the material are used different semiotic systems (scientific language, graphic and computering language) and didactictic material (tables, schemes, microphotos).

- ***Methods of recommended learning***

– **Analysis** – imaginary dividing of the whole material into component parts. Highlighting the essential elements. Studying each element as a component part of the total material

- **Analysis of the scheme/ figure** - selecting the necessary information. Recognition the indicated structures in the scheme or figure, based on the knowledge and selected information.
- **Comparing** - analysis of one pathological process from one group and establishment essential features of it. Analysis the second pathological process and it's features. Comparing of the processes and highlighting their common characteristics. Comparing of the processes and highlighting their differences. Establishment differential criteria. Formulation of conclusions.
- **Classification** – identification of the processes, or disorders that should to be classified. Determination of criteria which need for classification. Distribution of the processes or disorders in the groups according to established criteria.
- **Realising of the schemes for the learning process** - selection of the elements, which should to figure in the schemes. Explanation of selected elements by the different symbols/ colors and indication of the relationship between them. Formulation of the adequate title and to use syllabus.
- **Experiment** – formulation of hypothesis, based on known facts, according to the studded processes or phenomena. Evaluation of experiment algorithm. Checking the hypothesis by realising of studded processes/phenomena in laboratory condition. Viewing of didactic videos. Formulation of conclusions, deduced from arguments or findings at the end of the video's viewing.

- ***Strategy/didactic technology that are applied*** *(specific for the discipline)*

„ In the teaching of pathophysiology we use: (1) Real and virtual pathophysiology experiment; (2) Logical cascade solution of situational problems. The use of interactive teaching methods: brainstorming", "Case study"; "Multi-voting"; "Round table"; "Creative controversy"; "Focus-group technique".

- ***Evaluation methods (including an indication of how the final mark will be calculated)***
- **The current evaluation** at the Department of Pathology, discipline of Pathophysiology and Clinical Pathophysiology for students of the Faculty of Stomatology includes 2 concludings, in the form of computerised SIMU tests consisting of 25-questions (single choise and multiple choise) and evaluation of *individual work.* which consists of the presentation of the notebook with the solved clinical cases and their explanation.
- So, **annual media** is calculated from the marks obtained in the concludings during the semester (2 marks in the SIMU tests) and 1 mark attributed to individual work.
- For the admission to **final exam**, students shoud have all 3 marks and do not have absenses. In case they have at least one negative mark in the concluding or who have not recovered the absences from practical lessons and seminars will not be admitted to the final examination.

Final exam – SIMU test. The computerised test at the final evaluation consists of variations of 50 tests each from all the topics of the Pathophysiology course and the topics of the practical assignments, respectively. The student has 50 minutes to answer the tests. The test is marked with marks from 0 to 10.

The final mark consists of 2 components: annual average mark X 0.5; computerised SIMU test X 0.5.

Method of mark rounding at different assessment stages

Intermediate grill marks (annual average, marks from the examination stages)	National Assessment System	Equivalent ECTS
1,00-3,00	**2**	**F**
3,01-4,99	**4**	**F**
5,00	**5**	**E**
5,01-5,50	**5,5**	
5,51-6,0	**6**	
6,01-6,50	**6,5**	**D**
6,51-7,00	**7**	
7,01-7,50	**7,5**	**C**
7,51-8,00	**8**	
8,01-8,50	**8,5**	**B**
8,51-9,00	**9**	
9,01-9,50	**9,5**	**A**
9,51-10,0	**10**	

The average annual mark and the marks of all stages of final examination (computer assisted, test, oral) - are expressed in numbers according to the mark scale (according to the table), and the final mark obtained is expressed in number with two decimals, which is transferred to student's record-book.

VI. Absence on examination without good reason is recorded as "absent" and is equivalent to 0 (zero). The student has the right to have two re-examinations.

RECOMMENDED LITERATURE:

A. Compulsory:

1. Theoretical course PATHOPHYSIOLOGY, for students Faculty of Dentistry, 2019.

2. Color Atlas of Pathophysiology .S Silbernagl et al, Thieme 2000.

B. Extra

1. Robins & Cotran. Pathologic Basis of Diseases. Lippincot Williams & Wilkins, VIIIth edition. 2014
2. Carol Mattson Porth. Pathophysiology. Concepts of Altered Health State. Lippincot Williams & Wilkins, 2010.
3. Essentials of Pathophysiology. Lippincot Williams &Wilkins.2003
4. Stephen S. Mc Phee and Gary D. Hammer. Pathophysiology of Diseases: An introduction to Clinical Medicine, 2010