

**PRIVATE HIGHER EDUCATIONAL ESTABLISHMENT
«INTERNATIONAL ACADEMY OF ECOLOGY AND MEDICINE»**

Department of fundamental disciplines with a course of pharmacology

**SYLLABUS OF THE EDUCATIONAL
DISCIPLINE**

" Pathophysiology"


LEVEL OF HIGHER EDUCATION The second (master's) level

DEGREE OF HIGHER EDUCATION Master

AREA OF KNOWLEDGE 22 "Health care"

SPECIALTY 221 "Dentistry"

Reviewed and approved
at the meeting of the Department of fundamental
disciplines with a course of pharmacology

Protocol № 1 of « 01 » 09 2020
Head of the department Doctor of Biological
Sciences, associate professor
 M.R. Vergolyas

Kiev 2020

1. General information	
Subject	Pathophysiology
Lector	O. Brantova
Teacher's contact phone number	093 426 15 96
Teacher's e-mail	Elenabrant@ukr.net
Discipline format	Normative discipline.
The volume of the discipline	180 hours
Link to the distance learning site	maem.kiev.ua
Consultations	Tuesday of each week 16.00-17.30
2. Annotation to the course	
<p>The subject of study of the discipline "Pathophysiology" are the general patterns of functioning of the patient's body, which arise at the level of cells, organs, systems and the whole patient's body; determining the mechanisms of resistance and pre-disease, the occurrence and course of human diseases and their consequences.</p>	<p>Interdisciplinary links- Pathological physiology as a discipline: a) based on previously studied by students of basic principles and knowledge of anatomy, histology, medical and biological physics, bio- and bioorganic chemistry, medical biology, physiology, integrated with these disciplines; b) develops professional abilities for clinical thinking; provides the possibility of diagnosis, treatment, prevention and development of diseases; c) creates a theoretical basis for students to master pharmacology, clinical pharmacology and all clinical disciplines.</p>
3. Purpose and objectives of the course	
<p>The main tasks of studying the discipline " Pathophysiology " are:</p> <ul style="list-style-type: none"> - the theoretical foundations and form in students scientifically sound modern ideas about: <ul style="list-style-type: none"> - methods of pathophysiological experiments and basic experimental techniques; - ways to determine the relationship between the etiological factor and the pathogenetic link in the development of the pathological process; - mechanisms of occurrence of certain pathological conditions in the body; - methods and techniques of prevention to prevent the occurrence of a pathological condition . 	<p>The purpose of teaching the discipline " Pathophysiology " is to form students' ability to interpret the basic concepts of general nosology, understand the causes, mechanisms of development and manifestations of typical pathological processes and the most common diseases, analyze, draw conclusions about the causes and mechanisms of functional, metabolic and structural disorders of body systems in diseases; to provide fundamental training and acquisition of practical skills for the next professional activity.</p>
4. Competencies and learning outcomes	
<p>As a result of learning of of the discipline student have to</p> <p>know:</p> <ol style="list-style-type: none"> 1. basic concepts of general nosology; 2. the role of causes, conditions, reactivity of the organism in the emergence, development and completion (end) of diseases; 3. causes and mechanisms of typical pathological processes, conditions and reactions, their manifestations and significance for the body in the development of various diseases; 	

4. Factors, mechanisms and main manifestations of typical disorders of organs and physiological systems of the body;
5. etiology, pathogenesis, manifestations and consequences of the most common forms of pathology of organs and physiological systems, the principles of their etiological and pathogenetic therapy;
6. the importance of physical and formalized (non-physical) modeling of diseases and morbid conditions, pathological processes, conditions and reactions for medicine and biology in the study of pathological processes;
7. the role of different methods of modeling: experimental (on animals, isolated organs, tissues and cells; on artificial physical systems), logical (intellectually), computer, mathematical, etc. In the study of pathological processes; their capabilities, limitations and prospects;
8. the importance of pathophysiology for the development of medicine and health care; connection of pathophysiology with other medical-biological and medical disciplines.

be able:

1. to solve professional tasks of the doctor on the basis of the pathophysiological analysis of concrete data on pathological processes, states, reactions and diseases;
2. to conduct pathophysiological analysis of clinical-laboratory, experimental, other data and to formulate on their basis the conclusion on the most probable reasons and mechanisms of development of pathological processes (diseases), principles and methods of their detection, treatment and prevention;
3. apply the acquired knowledge in the study of clinical disciplines in further treatment and prevention activities;
4. analyze the problems of pathophysiology and critically evaluate modern theoretical concepts and directions in medicine;
5. to plan and participate in conducting (in compliance with the relevant rules) experiments on animals; process and analyze the results of experiments, correctly understand the importance of the experiment to study clinical forms of pathology;
6. interpret the results of the most common diagnostic methods;
7. solve situational problems of different types;
8. record the ECG and determine the main types of arrhythmias, signs of ischemia and myocardial infarction;
9. evaluate the cellular composition of inflammatory exudate and phagocytic activity of leukocytes;
10. analyze the leukocyte formula of neutrophils and on this basis to formulate a conclusion about changes in it;
11. to formulate a conclusion on the hemogram about the presence and type of a typical form of pathology of the blood system;
12. to determine the typical forms of gas exchange disorders of lung function on the indicators of alveolar ventilation, gas composition of blood and blood flow in the lungs;
13. differentiate pathological types of respiration and explain the mechanisms of their development;
14. to characterize typical disorders of renal function according to blood tests, urine and clearance tests;
15. differentiate between different types of jaundice;
16. evaluate the indicators of acid-base status (ABS) and formulate conclusions about different types of its violations;
17. differentiate between different types of hypoxia;
18. to determine the typical disorders of the secretory function of the stomach and intestines according to the analysis of gastric and intestinal contents;
19. substantiate the principles of pathogenetic therapy of the most common diseases.

According to the requirements of the Standard of High Education, the discipline "Pathological Physiology" provides students with the following *competencies*:

Integral:

- Ability to solve typical and complex specialized problems and practical problems in professional activities in the field of health care, or in the learning process, which involves research and/or innovation and is characterized by complexity and uncertainty of conditions and requirements.

General:

- ability to abstract thinking, analysis and synthesis;
- ability to learn and master modern knowledge;
- ability to apply knowledge in practical situations;
- knowledge and understanding of the subject area and understanding of professional activity ;
- ability to make informed decisions;

- skills of using information and communication technologies;
- determination and persistence in relation to the set tasks and responsibilities.

Special (professional, subject):

- Ability to understand the subject area of pathophysiology.
- The ability to analyze the structural and functional relationships and the sequence of stages of general pathological processes.
- The ability to interpret cell pathology and characterize the general pathological processes that cause the manifestations of diseases.
- Ability to interpret the etiology, pathogenesis.
- Ability to diagnose diseases.

Matrix of competencies

№	Competence	Knowledge	Skills	Communication	Autonomy and responsibility
Integral competence					
Ability to solve typical and complex specialized problems and practical problems in professional activities in the field of health care, or in the learning process, which involves research and / or innovation and is characterized by complexity and uncertainty of conditions and requirements.					
General competencies					
1	Ability to apply knowledge with Pathological physiology in practical situations, knowledge and understanding of the subject area of pathological physiology, ability to choose communication strategies, ability to work in a team, interpersonal skills, skills in the use of information and communication technologies, definiteness and persistence in terms of tasks and responsibilities				
Special (professional, subject) competencies					
1	Ability to diagnose diseases.	Know the leading clinical symptoms and syndromes (according to list 1); according to standard methods, using preliminary data of the patient's anamnesis, data of the patient's examination, knowledge about the person, his organs and systems.	In to form a probable nosological or syndromic preliminary clinical diagnosis of the disease (according to list 2) in the conditions of a health care institution, at the patient's home and at the stages of medical evacuation, incl. in the field, using knowledge about the person, his organs and systems, adhering to the relevant ethical and legal norms, by making an informed decision according to existing algorithms and standard schemes.	Clear and unambiguous communication of own conclusions, knowledge and explanations on this issue	Be responsible for quality work performed
2	Ability to analyze the structural and functional relationships and the sequence of stages of general pathological processes.	Know the functional relationships and sequence of stages of general pathological processes.	Determine the functional relationships and sequence of stages of general pathological processes.	Clear and unambiguous communication of own conclusions, knowledge and explanations on this issue	Be responsible for deciding on Interpretive ted structural and functional s relationships s a consistently at and stages of cl pathological processes.

3	Ability to interpret cell pathology and characterize general pathological processes that cause disease.	Know the pathology of the cell and functional relationships and the sequence of stages of general pathological processes.	Determine cell pathology and establish functional relationships and sequence of stages of general pathological processes.	Clear and unambiguous communication of own conclusions, knowledge and explanations on this issue	Be responsible for deciding on Interpretive the pathologies of cell and the character of general pathological process along , causing manifestations of disease.
4	Knowledge of the basic principles of application of research of human pathophysiology	Know the role and features of the application of research of human pathophysiology	Be able to be right determine pathophysiological parameters	Establish links for discussion in establishing pathophysiological parameters	Be responsible for making a decision when determination of pathophysiological parameters

5. Organization of course training

The volume of the course

Type of lesson	Total amount of hours 180
Lectures	30
Practical classes	80
Independent work	70

Course signs

Semesters: the 4th, the 5th	Specialty 221 "Dentistry"	Course (year of study) : The 2nd, the 3rd	Normative discipline
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Course thematics

The program of the discipline is structured into 2 modules:

Module I . General pathology.

From content modules:

- 1). General nosology - a general study of the disease, etiology and pathogenesis. Pathogenic action of environmental factors. The role of internal factors in pathology.
- 2). Typical pathological processes.
- 3). Typical metabolic disorders.

Module II . Pathophysiology of organs and systems.

Content modules :

- 4). Pathophysiology of the blood system.
- 5). Pathophysiology of systemic circulation and external respiration.
- 6). Pathophysiology of digestion, liver, kidneys.
- 7). Pathophysiology of regulatory systems (endocrine, nervous) and extreme conditions.

THEMATIC PLAN OF LECTURES
The 2nd course. The IVth semester

№	TOPIC	Hours
	Module 1. General pathology	
1.	Subject and tasks of pathophysiology. Methods of pathophysiological research. The doctrine of disease, etiology and pathogenesis.	2
2.	The role of heredity, constitution, age-related changes in pathology.	2
3.	Cell pathophysiology. General mechanisms of cell damage and death.	2
4.	Immune system disorders. Lack of immunity.	2
5.	Allergy. Etiology, pathogenesis, clinical manifestations.	2
6.	Inflammation: types, manifestations. Etiology, pathogenesis of acute and chronic inflammation.	2
7.	Tumors. Features of tumor growth. Etiology and pathogenesis of tumor growth.	2
8.	Disorders of carbohydrate metabolism. Diabetes mellitus.	2
9.	Protein and water - salt metabolism. Edema: types, etiology, pathogenesis.	2
10.	Violation of the acid-base state. Acidosis, alkalosis.	2
	Total:	20

The 3rd semester. The Vth semester

№	TOPIC	Hours
	Module 2. Pathophysiology of organs and systems.	2
1.	Pathophysiology of the blood system. Anemia: principles of classification, types, etiology, pathogenesis.	2
2.	Leukocytosis, leukopenia. Leukemia. Etiology, pathogenesis of leukocytosis and leukopenia.	2
3.	Pathophysiology of the circulatory system. Insufficiency of blood circulation. Heart failure.	2
4.	Pathophysiology of the digestive system and liver.	2
5.	Pathophysiology of extreme conditions.	2
	Total:	10

THEMATIC PLAN OF PRACTICAL CLASSES

The 2nd course. The IVth semester

№	TOPIC	Hours
1.	Subject and tasks of pathophysiology. Her methods. The concept of health and illness. Etiology and pathogenesis.	2
2.	Pathogenic action of physical factors. Ionizing radiation.	2

3.	The role of heredity, constitution, age-related changes in pathology.	2
4.	Violation of immunological reactivity.	2
5.	Allergy.	2
6.	Typical disorders of peripheral circulation and microcirculation.	2
7.	Inflammation.	2
8.	The role of cytokines in inflammation. Arachidon cascade.	2
9.	Fever.	2
10.	Tumors are not processes .	2
11.	Hypoxia.	2
12.	Disorders of carbohydrate metabolism.	2
13.	Disorders of water-salt metabolism.	2
14.	Violation of the acid-base state.	2
15.	Differentiated credit.	2
Total:		40

The 3rd course. The Vth semester

№	TOPIC	Hours
Module 2. Pathophysiology of organs and systems.		
1.	Anemia caused by blood loss.	2
2.	Hemolytic anemia.	2
3.	Anemia caused by erythropoiesis disorders.	2
4.	Leukocytosis, leukopenia.	2
5.	Leukemia.	2
6.	Disorders of the hemostasis system.	2
7.	Test control for submodule "Pathophysiology of the blood system"	2
8.	Insufficiency of blood circulation.	2
9.	Heart failure. Coronary insufficiency.	2
10.	Pathophysiology of blood vessels.	2
11.	Pathophysiology of external respiration. Respiratory failure. Test control.	2
12.	Pathophysiology of the digestive system. Insufficiency of digestion.	2
13.	Pathophysiology of the liver. Hepatic failure.	2
14.	Pathophysiology of the kidneys. Renal failure.	2
15.	Control of assimilation of the content module "Pathophysiology of digestion, liver, kidneys".	2
16.	Pathophysiology of the endocrine system 1.	2
17.	Pathophysiology of the endocrine system 2.	2
18.	Pathophysiology of the nervous system.	2
19.	Pathophysiology of extreme conditions.	2
20.	Final test control.	2
Total:		40

THEMATIC PLAN OF INDEPENDENT WORK OF STUDENTS The 2nd course. The IVth semester

№	TOPIC	Hours
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1.	The main stages of development of pathophysiology.	1
2.	The doctrine of the disease, the etiology of pathogenesis.	1
3.	Pathogenic action of physical factors.	1
4.	Pathogenic action of chemical factors.	1
5.	Pathogenic action of biological factors.	1
6.	The role of heredity, constitution, age-related changes in pathology.	1
7.	Reactivity pathology. Violation of immunological reactivity.	1
8.	Allergy.	1
9.	Cell pathophysiology. Cell damage.	1
10.	Typical disorders of peripheral circulation and microcirculation.	1
11.	Inflammation.	1
12.	Fever.	1
13.	Tumors.	1
14.	Starvation.	3
15.	Hypoxia.	1
16.	Disorders of energy metabolism.	3
17.	Disorders of carbohydrate metabolism.	1
18.	Disorders of fat metabolism.	3
19.	Disorders of protein metabolism, purine and pyrimidine bases.	1
20.	Disorders of vitamin metabolism.	3
21.	Disorders of water-salt metabolism.	1
22.	Violation of the acid-base state.	1
Total:		30

The 3rd course. The Vth semester

№	TOPIC	Hours
1.	Anemia caused by blood loss.	2
2.	Hemolytic anemias and anemias caused by erythropoiesis disorders.	2
3.	Leukocytosis.	2
4.	Leukopenia.	2
5.	Leukemia.	2
6.	Disorders of the hemostasis system. DIC syndrome.	2
7.	Pathophysiology of systemic circulation. Circulatory failure.	2
8.	Heart failure.	2
9.	Coronary insufficiency.	2
10.	Pathophysiology of blood vessels.	2
11.	Pathophysiology of external respiration. Respiratory failure.	2
12.	Pathophysiology of the digestive system. Insufficiency of digestion.	4
13.	Pathophysiology of the liver. Hepatic failure.	2
14.	Pathophysiology of the kidneys. Renal failure.	2
15.	Pathophysiology of the endocrine system.	2
16.	Pathophysiology of the nervous system.	2
17.	Pathophysiology of extreme conditions.	2
18.	Exam preparation	4
Total:		40

LIST OF THEORETICAL QUESTIONS FOR PREPARATION OF STUDENTS FOR THE FINAL MODULAR CONTROL

Module I. General pathology

1) General nosology - a general study of the disease, etiology and pathogenesis.

Pathogenic action of environmental factors. The role of internal factors in pathology

1. Subject and tasks of pathophysiology, connection with other sciences, significance for the clinic. Pathophysiology as an academic discipline.
2. Methods of pathophysiology. Experiment, its significance for solving fundamental problems of medicine. Types of experiment. The main stages of experimental research. Modern methods and techniques of modeling pathological processes.
3. History of the development of pathophysiology in Ukraine (N.A. Hrzhonshchevsky, V.V. Pidvysotsky, O.O. Bogomolets, O.V. Repryov, D.O. Alpern).
4. Basic concepts of nosology: health, disease, pathological condition, pathological process, typical pathological process, pathological reaction.
5. Universal periods in the development of the disease. Options for ending the disease. The concept of terminal states: agony, clinical death, biological death. Principles of resuscitation.
6. Definition of "etiology". The main directions of the doctrine of etiology: monocausalism, conditionalism, constitutionalism.
7. Definition of "pathogenesis". Pathological (destructive) and adaptive-compensatory (protective) phenomena in the pathogenesis (on the examples of acute radiation sickness, inflammation, blood loss).
8. Patterns of development of mechanical injury. Traumatic shock. Prolonged crushing syndrome.
9. General and local action of thermal factors on the body. Pathological or adaptive, and compensatory changes in the pathogenesis of hypo- and hyperthermia.
10. Local and general effect of ionizing radiation on the body. Acute radiation sickness, its forms. Pathogenesis of bone marrow form of acute radiation sickness. Long-term effects of ionizing radiation.
11. Pathogenic effects of excessive and insufficient insolation by ultraviolet rays. Photosensibilization.
12. Effect on the body of high and low atmospheric pressure. Pathogenesis of compression and decompression syndromes.
13. Chemical pathogens as a problem of ecology and medicine. Toxicity, carcinogenicity, teratogenicity of chemical compounds. Pathophysiological aspects of smoking, alcoholism and drug addiction.
14. Infectious process, general patterns of development. Mechanisms of protection of an organism against an infection.
15. Hereditary and congenital diseases. Mutations as a cause of hereditary diseases (types, causes, consequences of mutations). Mutagenic effects.
16. Chromosomal diseases, their etiology, pathogenesis. General characteristics of Down, Klinefelter, Shereshevsky-Turner syndromes.
17. Anomalies of the constitution as a risk factor for the occurrence and development of diseases. Classifications of constitutional types according to Hippocrates, Sigo, Kretsch-mayor, Sheldon, IP Павлович, O.O. Bogomolets, MV Chornorutsky.
18. Aging. Structural, functional and biochemical manifestations of aging. Progeria. Modern theories of aging.
19. Types of immune deficiency. Etiology, pathogenesis of primary and secondary immunodeficiencies.
20. Etiology, pathogenesis of AIDS. Pathophysiological characteristics of periods of HIV infection. Typical clinical manifestations.
21. Classification of immune responses by mechanisms of cell damage or dysfunction (according to Coombs and Jell).
22. Definition of "allergy", principles of classification of allergic reactions. Multifactorial nature of allergic diseases. Classification and characterization of allergens.
23. Type 1 allergic reactions (anaphylactic), according to Coombs and Jell. Etiology, pathogenesis, clinical manifestations of local and systemic anaphylactic reactions. Mediators of anaphylaxis.
24. Type 2 allergic reactions (cytotoxic, antibody-mediated), according to Coombs and Jell. Etiology, pathogenesis, clinical manifestations.
25. Type 3 allergic reactions (mediated by immune complexes), according to Coombs and Jell. Etiology, pathogenesis, clinical manifestations of local and systemic reactions.

26. Type 4 allergic reactions (cell-mediated), according to Coombs and Jell. Etiology, pathogenesis, clinical manifestations.
27. Type 5 allergic reactions (cellular dysfunctions mediated by antibodies). Etiology, pathogenesis, clinical manifestations.
28. Basics of organ and tissue transplantation. Causes and mechanisms of graft rejection, means of prevention. Graft-versus-host disease.
- 2). Typical pathological processes**
1. Cell damage, principles of classification. Cell death (necrosis, apoptosis), their symptoms.
 2. Universal mechanisms of cell damage.
 3. Mechanisms of cellular protection and adaptation of cells to the action of damaging factors.
 4. Arterial and venous hyperemia: definition, manifestations, types, causes and mechanisms of development, completion options and consequences.
 5. Ischemia: definition, manifestations, types, causes, mechanisms of development, consequences. Mechanisms of ischemic cell damage.
 6. Thrombosis: definition, types of blood clots. Causes, mechanisms, consequences of thrombosis.
 7. Embolism: definition, types of emboli. Features of the pathogenesis of embolism of the great and small circulatory system, the portal vein system.
 8. Stasis: definition, types, causes, pathogenesis, consequences.
 9. Disorders of microcirculation, classification. Sludge syndrome: definition, causes and mechanisms of development. Disorders of local lymph circulation, types, causes and mechanisms of development.
 10. Inflammation: definition, principles of classification. Characteristics of acute and chronic inflammation. General manifestations and local signs of inflammation. Etiology of inflammation.
 11. Pathogenesis of acute inflammation, stages. Combination of pathological and adaptive-compensatory changes in the dynamics of acute inflammation. Alteration, types, causes, mechanisms.
 12. Changes in local blood circulation in inflammation (according to J. Congheim). Pathogenesis of separate stages of vascular reaction in the center of acute inflammation.
 13. Exudation in the inflammatory focus, its causes and mechanisms. Phases of increasing the permeability of the vascular wall. Types of exudates.
 14. Emigration of leukocytes in the inflammatory focus. Sequence, causes and mechanisms of leukocyte emigration. The role of leukocytes in the development of local and general manifestations of inflammation. Mechanisms of microbial neutralization by leukocytes.
 15. Metabolic disorders in the inflammatory focus. Inflammation mediators, their classification. Mediators of inflammation of cellular origin; characteristics of their biological effects.
 16. Proliferation of cells in the inflammatory focus, its mechanisms.
 17. Fever: definition, principles of classification. The association between fever and with inflammation. Types of pyrogens.
 18. The main differences between fever, exogenous overheating and other types of hyperthermia.
 19. Tumor: definition, principles of tumor classification. General patterns of tumor growth. Molecular genetic basis of infinite growth and potential immortality of tumor cells.
 20. Typical properties of benign and malignant tumors. Types of anaplasia. Ways and mechanisms of metastasis.
 21. Etiology of tumors. General characteristics of carcinogens. Risk factors and conditions of occurrence and development of tumors.
 22. Physical carcinogens. Chemical carcinogens: Principles Classification tion, characteristics of the main groups.
 23. Pathogenesis of tumor growth. The role of disorders of molecular (genetic) mechanisms of regulation of cell division in the process of tumor transformation. Methods of conversion of protooncogenes into oncogenes. Properties of oncoproteins.
 24. Tumor progression: definition, causes and mechanisms, typical features. 2 5 . Mechanisms of invasive growth and metastasis. The effect of the tumor on the body. Pathogenesis of cancer cachexia.
 26. Mechanisms of natural antitumor protection, immune and non-immune.
 27. Fasting: definition, classification. External and internal causes of starvation. Characteristics of disorders of basal metabolism and metabolism in different periods of complete starvation (with water).
 28. Pathophysiology of incomplete and partial (qualitative) starvation. Types, causes and mechanisms of the most important manifestations. The concept of medical fasting.
 29. Hypoxia: definition, classification, etiology, pathogenesis. Pathological changes and adaptive-compensatory reactions in hypoxia.
- 3). Typical metabolic disorders**

1. Disorders of energy metabolism: etiology, pathogenesis, consequences. The concept of energy needs of the body, positive and negative energy balance.
2. Characteristics of disorders of carbohydrate metabolism; criteria for euglycemia, hypoglycemia, hyperglycemia, impaired glucose tolerance.
3. Causes and mechanisms of hypoglycemic conditions. Pathogenesis of hypoglycemic coma.
4. Definition, classification of diabetes mellitus (WHO). General characteristics of the main types of diabetes mellitus (type of insulin deficiency, its origin, features of the course, typical manifestations, complications and principles of treatment).
5. Etiology of type 1 diabetes mellitus (importance of hereditary and environmental factors in the development of absolute insulin insufficiency). Pathogenesis of type 1 diabetes mellitus: disorders of protein, carbohydrate, fat, water-electrolyte metabolism and acid-base status. Clinical manifestations.
6. Etiology, pathogenesis of type 2 diabetes. The role of hereditary factors. Causes of relative insulin insufficiency. Metabolic and physiological disorders. Clinical manifestations.
7. Complications of diabetes. Causes and mechanisms of different types of coma in diabetes. Long-term complications of diabetes.
8. Experimental modeling of diabetes mellitus. Principles of prevention and therapy of its main types. Prevention of complications of diabetes.
9. Principles of classification dyslipoproteinemia. Etiology and pathogenesis of primary (hereditary) and secondary hyperlipoproteinemias.
10. Obesity: definition, classification; etiology and pathogenesis of individual forms. Experimental modeling of obesity, Medical problems related to obesity.
11. Positive and negative nitrogen balance. Types of hyperazotemia. Changes in the protein composition of the blood. Hereditary disorders of amino acid metabolism.
12. Disorders of purine and pyrimidine metabolism. Etiology of the pathogenesis of gout.
13. Hypo- and hypervitaminosis: types, causes and mechanisms of development Pathogenesis of the main clinical manifestations. Principles of correction of vitamin deficiency.
14. Disorders of water-salt metabolism. Forms of hyper- and hypohydria, her; etiology, pathogenesis, consequences. Disorders of sodium and potassium metabolism: causes, mechanisms, clinical manifestations.
15. Edema: definition, types, causes and mechanisms of edema (according to Starling).
16. Acidosis: definition, classification, causes of development Compensatory and pathological reactions. Indicators of acid-base status in different types of acidosis, the principles of correction.
17. Alkalosis: definition, classification, causes of development Compensatory and pathological reactions. Indicators of acid-base status in different types of alkalosis, the principles of correction.

Module II. Pathophysiology of organs and systems.

4). Pathophysiology of the blood system

1. Disorders of total blood volume: classification, causes and mechanisms of development.
2. Etiology, pathogenesis of blood loss. Pathogen from posthemorrhagic shock.
3. Erythrocytosis: definition, types, their etiology, pathogenesis.
4. Anemia: definition, principles of classification. Regenerative, degenerative, pathological forms of erythrocytes. Posthemorrhagic anemia: types, causes, pathogenesis, blood picture.
5. Hemolytic anemia, classification; causes and mechanisms of hemolysis) of erythrocytes. Clinical and hematological characteristics of different types of hemolytic anemias.
6. Iron deficiency anemia: causes and mechanisms of development, types of changes in peripheral blood, pathogenesis of major clinical manifestations.
7. Causes and mechanisms of vitamin deficiency in B₁₂ and folic acid. Characteristics of general disorders in the body with a deficiency of vitamin B₁₂ and/or folic acid.
8. Leukocytosis: types, causes and mechanisms of development. Concomitant nuclei and shifts of neutrophilic granulocytes. Leukemoid reactions.
9. Leukopenia: types, causes and mechanisms of development. Agranulocytosis. Neutropenia. Concomitant nuclear shifts of neutrophilic granulocytes.
10. Leukemia: definition, principles of classification. Etiology of leukemia.
11. Violation of the cellular composition of bone marrow and peripheral blood in acute and chronic leukemia. Pathogenesis of leukemia: progression, metastasis, systemic disorders. Principles of diagnosis and treatment of leukemia.
12. Violation of vascular-platelet hemostasis. Etiology and pathogenesis of vasopathy, thrombocytopenia, thrombocytopathy.

13. Insufficiency of coagulation hemostasis. Causes and mechanisms of violations of certain stages of blood clotting.

14. Disseminated intravascular coagulation syndrome, principles of classification, etiology, pathogenesis, clinical manifestations. Role in pathology.

5). Pathophysiology of the circulatory system and external respiration

1. Circulatory failure: definition, principles of classification, causes and mechanisms of its various types.

2. Pathogenesis of the main clinical manifestations of chronic circulatory failure.

3. Heart failure: definition, principles of classification. Causes of heart overload with volume and resistance. Mechanisms of immediate and long-term adaptation of the heart to overload.

4. Myocardial heart failure. Etiology, pathogenesis of non-coronary myocardial damage. Experimental modeling.

5. Cardiomyopathy: definition, principles of classification; etiology, pathogenesis.

6. Insufficiency of coronary circulation: definition, causes and mechanisms of development, clinical manifestations.

7. Ischemic heart disease: types, etiology, pathogenesis, clinical manifestations. Pathogenesis of manifestations and complications of myocardial infarction.

8. Cardiac arrhythmias. Experimental modeling. Causes, mechanisms of disorders of automatism, excitability, conductivity, typical electrocardiographic manifestations.

9. Extramyocardial heart failure. Lesions of the pericardium. Acute cardiac tamponade, manifestations and consequences.

10. Hypertension: definition, principles Classification tion. Primary and secondary hypertension. Hemodynamic options.

11. Causes and mechanisms of secondary arterial hypertension, experimental modeling.

12. Primary arterial hypertension as a multifactorial disease; modern ideas about the etiology and pathogenesis of hypertension. The role of the kidneys in the pathogenesis of primary hypertension.

13. Hypertension of the small circle of blood circulation (primary, secondary). Causes and mechanisms of development. Clinical and hemodynamic manifestations.

14. Arterial hypotension. Etiology and pathogenesis of acute and chronic hypotension.

15. Atherosclerosis. Etiology of atherosclerosis: risk factors, causal factors. Modern theories of atherogenesis. The role of hereditary and acquired disorders of receptor-mediated transport of lipoproteins in atherogenesis.

16. Insufficiency of external respiration: definition, principles of classification. Pathogenesis of the main clinical manifestations. Shortness of breath: types, causes, mechanisms of development.

17. Dysregulatory disorders of alveolar ventilation. Causes and mechanisms of pathological respiration (frequency, depth, rhythm disorders).

18. Violation of alveolar ventilation. Obstructive and restrictive mechanisms of development.

19. Causes and mechanisms of gas diffusion disorders in the lungs. Pulmonary circulatory disorders. Violation of general and regional ventilation-perfusion relationships in the lungs.

20. Asphyxia: definition, causes, pathogenesis. Terminal respiration.

6). Pathophysiology of digestion, liver, kidneys

1. Causes and mechanisms of digestive disorders in the oral cavity. Etiology, pathogenesis, experimental models of caries and periodontitis. Causes, mechanisms of salivation disorders.

2. General characteristics of disorders of motor and secretory functions of the stomach. Pathological gastric secretion, its types. The role of nervous and humoral mechanisms in secretion disorders.

3. Etiology, pathogenesis of peptic ulcer of the stomach and/or duodenum. Etiology, pathogenesis of symptomatic gastric and/or duodenal ulcers.

4. Disorders of cavity digestion in the intestines; causes, mechanisms, manifestations. Disorders associated with secretory insufficiency of the pancreas. Pancreatitis: types, causes; pathogenesis of acute pancreatitis.

5. Absorption disorders. Reasons of mechanisms for providing malabsorption pathogenesis of main clinical manifestations.

6. Intestinal dyskinesias. Causes and mechanisms of constipation and diarrhea. Intestinal obstruction: types, etiology, pathogenesis.

7. Liver failure: definition, principles of classification, causes, experimental modeling.

8. Typical disorders of carbohydrate, protein, lipid, water-electrolyte metabolism, metabolism of vitamins and hormones, systemic disorders in the body with liver failure.

9. Causes, mechanisms, clinical manifestations of antitoxic liver function. Theories of the pathogenesis of hepatic coma.

10. Insufficient excretory function of the liver: causes, mechanisms, clinical manifestations. Disorders of bile pigment metabolism in different types of jaundice.
11. Impaired hemodynamic function of the liver. Portal hypertension syndrome: etiology, pathogenesis, clinical manifestations.
12. Causes and mechanisms of disorders of filtration, reabsorption and secretion in the kidneys. Functional tests to determine impaired renal function.
13. The causes and mechanisms of quantitative and qualitative changes in the composition of urine, oliguria, anuria, polyuria, hypostenuria, isostenuria, proteinuria, hematuria, cylindruria, leukocyturia.
14. Acute renal failure syndrome: definition, causes and mechanisms of development, clinical manifestations. Nephrotic syndrome.
15. Syndrome of chronic renal failure: definition, causes and mechanisms of development, clinical manifestations. Pathogenesis of uremic coma.
16. Glomerulonephritis: definition, principles of classification, experimental models.
- 7). Pathophysiology of regulatory systems (endocrine, nervous) and extreme conditions**
1. Typical disorders of the endocrine glands, their causes and mechanisms of development. Disorders of direct and inverse regulatory connections in the pathogenesis of dysregulatory endocrinopathies.
2. Glandular endocrinopathies. Causes and mechanisms of disorders of biosynthesis, deposition and secretion of hormones.
3. Peripheral disorders of endocrine function. Disorders of transport and inactivation of hormones. Disorders of hormone reception.
4. Pathology of the neuroendocrine system. Causes and mechanisms of development of syndromes of excess and deficiency of pituitary hormones, their general characteristics.
5. Insufficiency of the adrenal cortex, acute and chronic: causes and mechanisms of development, pathogenesis of the main clinical manifestations.
6. Hyperfunction of the adrenal cortex. Itsenko-Cushing syndrome. Primary and secondary hyperaldosteronism.
7. Hypothyroidism: causes and mechanisms of development, pathogenesis of the main clinical manifestations.
8. Goiter: types, etiology, pathogenesis; functional disorders) of the thyroid gland.
9. Hypo- and hyperfunction of the parathyroid glands: etiology of pathogenesis, typical disorders in the body.
10. Dysfunction of the gonads: primary and secondary conditions and hyper- and hypogonadism. Etiology, pathogenesis, typical clinical manifestations.
11. Stress. Definition of the concept, causes and mechanisms of stage development. The concept of "adaptation disease".
12. General characteristics of pathology of the nervous system, the principle of classification of disorders of its activity.
13. Disorders of sensory function of the nervous system. Disorders of mechano-thermo-, proprio- and nociception. Violation of sensory information .
14. Pain. Principles of classification. Somatic pain. Modern ideas; on the causes and mechanisms of pain: the theory of impulse distribution, the theory of specificity. Pathological pain. The body's response to pain. Nature's antinociceptive mechanisms.
15. Impaired motor function of the nervous system. Experimental modeling of motor disorders. Peripheral and central paralysis or paresis: causes, mechanisms, manifestations.
16. Violation of autonomic functions of the nervous system, the method of experimental modeling. Syndrome of vascular dystonia.
17. Disorders of trophic function of the nervous system. Neurogenic dystrophies. Structural, functional and biochemical changes in denervated organs and tissues.
18. Representation of extreme conditions. General characteristics.
19. Causes and mechanisms of shock, clinical and pathophysiological manifestations.
20. Coma: definition, varieties; causes and mechanisms of comatose states.

SCOPE OF WORK AND PRACTICAL PROBLEMS FOR FINAL CONTROL

Section I. General pathology

1. Analyze the level of glycemia and glucosuria, evaluate the result.
2. Determine the acidity and content of ammonium salts in the test urine by titration; conclude.

Section II. Pathophysiology of organs and systems

1. Determine the content of hemoglobin in the blood by the method of Salie, evaluate the result.

2. Calculate the color index of the blood, evaluate the result.
3. Identify regenerative forms of erythrocytes in peripheral blood smears (stained according to Romanovsky), interpret their presence or absence.
4. Identify regenerative forms of erythrocytes in blood smears stained supravivally, assess the value of their presence or absence in the blood.
5. Identify pathological forms of erythrocytes in a peripheral blood smear, interpret their presence in the blood.
6. Calculate the content of erythrocytes per unit volume of blood, conclude that the quantitative composition of the "red" "blood" (anemia, erythrocytosis).
7. To determine the pathogenetic variant of anemia in a patient, based on the anamnesis, hemogram data, description of the peripheral blood smear.
8. On the basis of data on the total number and leukocyte formula to calculate the absolute number (g/l) of individual types of leukocytes in the blood, to interpret the result.
9. To determine the type of nuclear shift of neutrophilic granulocytes (left, right) in the analysis of the provided leukogram.
10. To characterize the violation of the qualitative and quantitative composition of "white blood" according to the leukogram of a patient with chronic myelogenous leukemia.
11. Describe the violation of the qualitative and quantitative composition of "white blood" in the leukogram of a patient with chronic lymphocytic leukemia.
12. Based on the study of hemogram to characterize the changes in the qualitative and quantitative composition of blood in patients with acute leukemia.
13. On the basis of the analysis of the electrocardiogram to define disturbances of frequency and a heart rate (disturbance of automaticity, excitability, conductivity).
14. To determine the acidity of gastric juice by titration, to draw a conclusion about the state of gastric secretion

6. Course evaluation system

General course evaluation system

Current control is performed based on the control of theoretical knowledge, skills and abilities in practical classes. Independent study students are assessed in practical classes, and is an integral part of the final grade of the student. Current control is performed during the training sessions and aims at checking the assimilation of students learning the material. Forms of current control are:

- a) test tasks with a choice of one correct answer, with the definition of the correct sequence of actions, with determination of the conformity, defining the specific portion of the photo or diagram ("detection");
- b) individual oral questioning, interview;
- c) the solution of typical situational tasks;
- g) identification of pathogens and carriers of pathogens of parasitic diseases in the photographs, macro - and micropreparats;
- d) control of practical skills;
- e) the typical problems of genetics and medical genetics.

Grades on the national scale ("excellent" - 5, "good" - 4, "satisfactory" - 3, "unsatisfactory" - 2), received by students, are displayed in the journals of attendance and academic group performance.

Final control

The final control is the form of a differentiated credit at the end of the 1st semester and an exam at the end of the

2nd semester upon completion of the course of medical biology.

The semester exam is a form of final control of mastering by the student of theoretical and practical material on academic discipline. The final control (exam) is carried out at the last control lesson.

Students are admitted to the FC who have attended all the classes provided by the curriculum in the discipline and while studying the module scored the number of points not less than the minimum (**72 points**). A student who, for good or bad reasons, has missed classes, is allowed to rework academic debt for a certain period of time.

Evaluation of current educational activities. During the assessment of mastering each topic for the current educational activity of the student scores are set on a 4-point (national) assessment scale. This takes into account all types of work provided by the discipline program. The student must receive a score on each topic. Scores on the traditional scale are converted into points. The final assessment of the current academic activity is the arithmetic mean (the sum of scores for each lesson is divided by the number of lessons per semester) and translated into points according to **Table 2**.

Table 2. Conversion of the average score for the current activity into a multi-point scale (for disciplines completed by diff.credit, exam)

4-point scale	120-point scale	4-point scale	120-point scale	4-point scale	120-point scale	4-point scale	120-point scale
5	120	4,45	107	3,91	94	3,37	81
4,95	119	4,41	106	3,87	93	3,33	80
4,91	118	4,37	105	3,83	92	3,29	79
4,87	117	4,33	104	3,79	91	3,25	78
4,83	116	4,29	103	3,74	90	3,2	77
4,79	115	4,25	102	3,7	89	3,16	76
4,75	114	4,2	101	3,66	88	3,12	75
4,7	113	4,16	100	3,62	87	3,08	74
4,66	112	4,12	99	3,58	86	3,04	73
4,62	111	4,08	98	3,54	85	3	72
4,58	110	4,04	97	3,49	84	<3	Not enough
4,54	109	3,99	96	3,45	83		
4,5	108	3,95	95	3,41	82		

The maximum number of points that a student can collect for current educational activity during semester in order to be admitted to the exam is 120 points.

The minimum number of points that a student can collect for current educational activity during semester in order to be admitted to the exam is 72 points.

Calculating of the number of points is based on obtained marks of student according to traditional scale while learning subject during the semester, by

calculating the arithmetic mean (AM) that is rounded to two signs after comma.

Evaluation of independent work of students. Independent work of students, which is provided by the topic of the lesson together with the classroom work, is evaluated during the current control of the topic in the relevant lesson. Assimilation of topics that are submitted only for independent work is checked during the final module control.

Evaluation of final control.

The maximum number of points that a student can score during the exam is **80 points**.

The final control is considered credited if the student scored at least 60% of the maximum amount of points (for a 200-point scale - at least **50 points**).

Determining the number of points that a student scored in the discipline: the number of points that a student scored in the discipline is defined as the sum of points for the current academic activity (Table1) and for the final control (diff.credit, exam) (Table 3).

Table 3. Scale of assessment of differentiated (exam) credit:

Traditional scale	Points
«5»	70-80
«4»	60-69
«3»	50-59

Requirements for written work

The final written work is performed in the form of a test.

Practical classes

Classroom work

The 2nd course. The IVth semester

Module 1. General pathology

Topics 1-14:

Classroom work - score from 2 to 5 for each topic.

Topic 15: Diff.credit (Semester control): practical training, theoretical training.

Final module control is evaluated from 50 to 80 points and consists of:

Test control - 40 tests = 40 points (1 point for the correct answer to 1 test).

Answer to 2 theoretical questions of 20 points for each = 40 points. Amount: 80.

Scale of assessment:

Traditional scale	Points
«5»	70-80
«4»	60-69
«3»	50-59

Amount: minimum $72 + 50 = 122$, maximum $120 + 80 = 200$

The 3rd course. The Vth semester

Module 2. Pathophysiology of organs and systems.

Topics 1-6:

Classroom work - score from 2 to 5 for each topic.

Topic 7:
Test control. Written test control consists of 40 tasks.
Evaluation criteria

Score	«3»	«4»	«5»
Number of correct answers	20-29	30-34	35-40

Topics 8-14:
Classroom work - score from 2 to 5 for each topic.

Topic 15:
Test control. Written test control consists of 40 tasks.
Evaluation criteria

Score	«3»	«4»	«5»
Number of correct answers	20-29	30-34	35-40

Topics 16-19:
Classroom work - score from 2 to 5 for each topic.

Topic 20:
Final test control. Written test control consists of 40 tasks.
Evaluation criteria

Score	«3»	«4»	«5»
Number of correct answers	20-29	30-34	35-40

At the end of the course there is an exam.

The structure of the examination card:

1. Theoretical question
2. Theoretical question
3. Theoretical question
4. Situational task

**THE CRITERIA FOR EVALUATION
PRACTICAL SKILLS AND THEORETICAL QUESTIONS**

Number of Situational task	«5»	«4»	«3»	The answer a card to the practical skills	For each answer to the practical skill student receives from 10 to 16 points: «5» - 16 points; «4» - 13 points; «3» - 10 points.
1	16	13	10		
Number of Theoretical question	«5»	«4»	«3»	Oral answer the card on theoretical questions	For each answer to the practical skill student receives from 10 to 16 points: «5» - 16 points; «4» - 13 points; «3» - 10 points.
1	16	13	10		
2	16	13	10		
3	16	13	10		
The sum of points	80	65	50		

Students who have completed all types of work provided by the curriculum and scored the number of points for the current success not less than the minimum (72) are admitted to the exam. The total grade for the module and the discipline consists of a total grade for the activities in the current classes and the final control of student knowledge. Current activity is estimated from 72 to 120 points. Thus, the minimum number of points per module should be: $72 + 50 = 122$ points. Maximum number: $120 + 80 = 200$ points.

Rating scale:

National scale Points scale

«5»	70-80
«4»	60-69
«3»	50-59

LIST OF THE QUESTIONS FOR EXAM

1. Objectives of pathophysiology. Purpose of Pathophysiology. Methods of pathological physiology. Connection with other sciences.
2. Concept of health and illness. Connection is with adaptation. Concept of etiology and pathogenesis.
3. Etiology. Description of main etiological factors. Pathogenesis. Pathological reactions. Pathological process. Pathological condition.
4. Health and disease. Periods of a disease (latent, beginning of disease, manifestations of a disease, outcomes of diseases).
5. Immunodeficient states, etiology and pathogenesis.
6. Insufficiency of heart. Arrhythmias, etiology, pathogenesis.
7. Radiation. Issues and power of different radiation rays. Mechanisms of radiation inflow on the organism. Water radiolysis, lipid peroxidation and DNA mutations. Clinical types of radiation sickness. Dependence by dose. Pathophysiology of bone marrow form of radiation sickness. Its stages. Remote consequences of radiation influence on the organism.
8. Immunological disorders. Immunoregulation, mechanisms of its violation, consequences.
9. Immunodepressive states, etiology and pathogenesis.
10. Cardiac insufficiency. Classification of cardiac insufficiency according pathogenesis, clinical course, intensity of clinical symptoms. Mechanisms of cardiac insufficiency, which arises up as a result of overload by a volume. Mechanisms of cardiac insufficiency, which arises up as a result of overload by resistance. Mechanisms of compensation and decompensation.
11. The role of somatotype in pathology development. Classification of constitutional types. Constitutional markers . Anomalies of constitution as risk of origin and development of illnesses factor.
12. Allergy. Determination of concept. Classification, etiology and pathogenesis of allergy.
13. Hypertension, classification, etiology and pathogenesis.
14. Role of heredity in pathology. Congenital diseases. Categorization of congenital diseases. Etiology and pathogenesis of congenital diseases. Mutations and mutates (alcohol, nicotine, radiation e.g.).
15. Embolism. Exogenous and endogenous embolism. Consequences. Embolism by a blood clot. Causes of pulmonary, brain, cardiac embolism. Causes of fat, gas and air embolism development.
16. Respiratory insufficiency. Etiology, pathogenesis. Types of the pathological breathing.
17. Diabetes mellitus. Etiology. Types and there particularities. Pathogenesis of diabetes mellitus. Main metabolic disturbances. Clinical symptoms of diabetes mellitus and mechanisms of their development. Types of comas and their pathogenesis. Diabetic vascular complications
18. Diseases, concerned with genetic pathology. Autosomal disorders.
19. Stasis: causes, symptoms, and consequences. Blood rheological and plasma composition disturbances.
20. Pathology of digestion in the intestine. Syndromes of maldigestion, malabsorbtion. Causes and mechanisms of disturbanses. Causes of diarrhoea. Consequences.
21. Diseases, concerned with genetic pathology. Sex chromosome disorders.
22. Classification of microcirculation disturbances. Ischemia: causes, symptoms, and consequences.
23. Pathology of digestion in stomach. Quantitative and qualitative disorders of stomach secretory function. Pathologic types of gastric secretion.
24. Gene diseases: metabolic diseases (glycogenosis, phenylketonuria, galactosemia e.g.), blood diseases (hemoglobinosis S, elliptocytosis, hemophilia e.g.).
25. Classification of microcirculation disturbances. Venous hyperemia: causes, symptoms, and consequences.
26. Disorders of digestive system. Digestion distresses in oral cavity (mastications, salivations, swallowings). The causes and consequences. Dental caries. Ethiopathogenesis, preventive maintenance.
27. Causes, mechanisms and manifestations of microcirculation disturbances. Classification of microcirculation disturbances. Arterial hyperemia: causes, symptoms, and consequences.
28. Jaundice. Kinds. The characteristic of infringements of a pigmental exchange at separate kinds of jaundices (haemolytic, liver, mechanical).

29. Inflammation (flogosis). Causes and mechanisms of main inflammation signs development. Exogenous and endogenous causes of inflammation. Inflammation stages (alteration, exudation and emigration, proliferation).
30. Insufficiency of the liver. Portal hypertension. Causes. The characteristic of portal hypertension.
31. Inflammation (flogosis). Alteration. Primary and secondary alteration. Particularities of metabolism at alteration. Physicochemical changes at alteration.
32. Hypoxia. Definition . Classification. Causes and changes of blood gas parameters at hypoxic hypoxia. Causes and changes of blood gas parameters at respiratory, blood-depended circulative tissue hypoxia. Acute and chronic compensatory mechanisms to hypoxia.
33. Nature of hormones. Mechanism of hormone action. Hormonal regulatory systems. Pathologic mechanisms of endocrine disease. Causes of hormone excess and deficiency.
34. Inflammation. Leukocyte recruitment: margination, adherence to vascular wall, emigration through vascular wall, chemotaxis. Phagocytosis. Stages: chemotaxis, adherence to bacteria, absorption (phagosome formation), digestion (phagolysosome formation). Pus. Composition.
35. The tumor growth. Malignant and nonmalignant tumors. Description. Kinds of tumor atypism: morphological, biochemical, physicochemical, antigenic, functional. Etiology of tumors. Theories: radioactive, chemical, viral, genetical.
36. Coagulation disorders. Coagulopathies, classification. Causes. Hemophilia (type A, B). Features.
37. Description of microcirculation breaking in area of inflammation (short ischemia, arterial hyperemia, venous hyperemia, stasis) and mechanisms of their development.
38. The tumor growth. Pathogenesis of tumor growth. Stages: transformation, promotion, progression.
39. Disseminated intravascular coagulation (DIG). Causes. Stages, mechanisms of development.
40. Inflammation (flogosis). Exudation. Its biological value. Difference exudates from transudations fluid.
41. Tumor influence on the organism. Tumor disease. Pathogenesis of cancer cachexia. Antitumor activity of human organism.
42. Hypopituitarism. Etiology and pathogenesis. Nanism. Panhypopituitarism. Acromegaly and gigantism. Etiology and pathogenesis.
43. Inflammation (flogosis). Proliferation and regeneration. Types to regenerations.
44. Necrosis as general mechanism of accidental cell death. Consequences. Apoptosis. Comprising characteristic of apoptotic and necrotic cell death. Reparative processes in injured cells.
45. Syndrome of inappropriate antidiuretic hormone (ADH) secretion. Diabetes insipidus. Types of diabetes.
46. Categorization of inflammation: according to velocities of development (acute, subacute, chronic), according to dominating stage (alterative, exudative, proliferate), according to the exudate type (serous, festering, fibrinous, hemorrhagic and others).
47. Types of cell injure. Consequences of organelles injury (membrane, nuclear, mitochondria, ribosome, etc).
48. Hyperaldosteronism (Conn's disease), Cushings disease and syndrome, congenital adrenal hyperplasia. Pheochromocytoma. Mechanisms of development and consequences.
49. Local signs of inflammation (rubor, tumor, dolor, color, functio laesae) and mechanisms their development. General reactions at the inflammation (fever, leukocytosis, increase growing of settling an red blood cells and others).
50. Types of cell injure. Ion distribution in extra- and intracellular space. Role of ions in the cell function during pathological conditions.
51. Acute and chronic adrenal gland insufficiency. Addison disease. Mechanisms of development.
52. Inflammation mediators (histamine, bradykinine, complement system, prostaglandins, leukotrienes). Role of mediators. Outcomes of inflammation. Factors, influencing upon the current of inflammation. Biological role of inflammation.
53. Types of cell injure. Mechanisms of cell damage. Causes and consequences of cell energy production disturbance. Membrane damage.
54. Hyperthyroidism. Etiology. Pathogenesis of main symptoms.
55. Fever. Causes and mechanisms of fever development, its biological role, etiopathogenesis and consequences of hyperthermia and hypothermia influence on the organism.
56. Edema, classification. Factors influencing edema development. Pathogenesis of cardiac, renal, hepatic, inflammatory, allergic, toxic edema.
57. Clinical symptoms of anemia and mechanisms of their development. Categorization of anemias by: etiopathogenesis, color parameter, severity of anemia, regenerative possibility, type of hematopoiesis, erythrocyte's size.

58. Etiology of fevers. Categorization. Pyrogens (exogenous and endogenous). Pyrogen's action mechanism. Stages of fevers, their features. Changing of metabolism in the organism in the fever.
59. Pathology of vitamins metabolism. Deficiency of water-soluble vitamins (B1, B2, B6, B12, C, PP). Deficiency of fat-soluble vitamins (A, D, E, K).
60. Atherosclerosis. Pathogenesis. Atherogenic and antiatherogenic lipoproteins. Risk factors of atherosclerosis development.
61. Hyperthermia. Causes. Disturbances of organism in hyperthermia. Differentiation of hyperthermia from fever.
62. Causes of protein insufficiency. Consequences. Causes and consequences of intermediary amino acids metabolism. Pathology of plasma protein composition. Dysproteinemias types and features.
63. Extreme conditions. Stress. Definition. Theory of stress (H. Selye, 1938). Pathophysiology of stress. The role of sympathoadrenal and hypothalamo-hypophys-adrenal systems in stress. Stress stages.
64. Hypothermia. Causes. Disorders in organism in hypothermia. Hypothermia using in medicine.
65. Bleeding. Types and causes. Pathogenesis and main clinical symptoms of acute bleeding. Compensatory-adaptative reactions in acute bleeding. Stages of compensation (reflex, hydremic, bone-marrow). Parameters of severity of bleeding. Factors which effect bleeding outcome.
66. Extreme conditions. Shock. Definition. Pathophysiology of shocks. Stages of shock and their mechanisms. Types of shock. Mechanisms of decompensation at shock.
67. Immunological disorders. Categorization. AIDS. Etiology. Clinical symptoms and mechanisms of their development.
68. Post-hemorrhagic anemia. Description, the picture of the blood in acute and chronic post-hemorrhagic anemia.
69. Extreme conditions. Collapse, its causes and development. Difference between collapse and shock.
70. Reactivity. Types of reactivity (typical, group, individual). Physiological and pathophysiological reactivity. Specific and nonspecific mechanisms of reactivity. Degree of reactivity (normoergic, hyperergic and hypergic).
71. Iron deficiency anemia. Etiology, pathogenesis. Sideropenic syndrome. The picture of the blood.
72. Extreme conditions. Coma. Definition. Causes and types.
73. Resistance. Local and common resistance, hereditary and acquired resistance. Factors, which determine the reactivity and resistance (heredity, constitution, sex, environmental and social factors).
74. Hypothyroidism. Etiology. Pathogenesis of main symptoms.
75. Vitamin B12 and folic acid deficiency anemia. Etiology, pathogenesis. The picture of the blood. Addison-Biermer disease.
76. Types of starvation. Metabolic and functional disturbances in starvation. Principles of starvation therapy. Therapeutic starvation. Consequences of total and partial starvation (carbohydrates, lipids and protein deficit). Protein-calorie malnutrition. Particularities in children (Kwashiorkor).
77. Hyperparathyroidism. Hypoparathyroidism. Etiology. Pathogenesis of main symptoms.
78. Hemolytic anemia. Types (congenital, autoimmune e.g.). The picture of the blood. Clinical symptoms. Newborn hemolytic anemia.
79. Causes and consequences of carbohydrate digestion disturbances. Symptoms. Lactase deficiency. Hyperglycemia. Types. Consequences. Hypoglycemia. Types. Consequences.
80. Pyelonephritis. Etiopathogenesis. The characteristic of infringements.
81. Leukocytosis. Categorization. Causes of leukocytosis (neutrophilic, eosinophilic, basophilic, monocytic, lymphocytic).
82. Disorders of acid-base balance. Acidosis and alkalosis. Features. Parameters of acid-base balance under respiratory and metabolic acidosis. Parameters of acid-base balance under respiratory and metabolic alkalosis.
83. Glomerulonephritis. Etiopathogenesis. The characteristic of infringements.
84. Leucopenia. Categorization. Causes and outcomes of neutropenia, lymphopenia. Agranulocytosis.
85. Classification of water-mineral disturbances. Role of hormones in regulation of water-mineral balance. Negative water-mineral balance. Hypo-, iso- and hyperosmolaric types of dehydration. Causes, symptoms and consequences.
86. Nephrotic syndrome, Clinical manifestations. Pathogeny of hypostases in nephrotic syndrome. Pathogenesis of nephritic and nephrotic oedema.
87. Leukocyte's formula. Nuclear shift of leukocyte's formula to the left, to the right. Clinical importance of leukocyte's formula calculation.

88. Classification of water-mineral disturbances. Role of hormones in regulation of water-mineral balance. Negative water-mineral balance. Hypo-, iso- and hyperosmolaric types of dehydration. Causes, symptoms and consequences.
89. Nephrotic syndrome, Clinical manifestations. Pathogeny of hypostases in nephrotic syndrome. Pathogenesis of nephritic and nephrotic oedema.
90. Leukocyte's formula. Nuclear shift of leukocyte's formula to the left, to the right. Clinical importance of leukocyte's formula calculation.

Circumstance of admission to the final control

1. Semester control at the end of the 1st semester is provided in the form of a differential credit. (Table 2) Provides a final score on a 120-point scale as the sum of scores for the current control of knowledge (oral examination, written survey, tests, verification of identification of micropreparations, abstracts), the results of 2 content modules.
2. Students are allowed to take the differentiated credit, exam only if there is no debt for the implementation of the curriculum.

7. Course policy

The organization of the educational process is carried out with the use of the European Credit Transfer System (ECTS) to assess student performance. The points gained in the current survey, independent work and points of the final control are credited. This must take into account the student's presence in class and his activity during practical work. Inadmissible: absences and late classes; use of a mobile phone, tablet or other mobile devices during the lesson (except for the cases provided by the curriculum and methodical recommendations of the teacher); copying and plagiarism; untimely performance of the task, the presence of unsatisfactory grades for 50% or more of the submitted theoretical and practical material.

8. RECOMMENDED LITERATURE

Basic:

1. Pathophysiology / Copstead-Kirkhorn L.-E.C., Banasik J.L.- Elsevier Health Sciences, 2014.-652 p.
2. Pathophysiology / Kuba M., Kubová Z.- Hradec Králové, 2005. - 203 p.
3. Pathophysiology of Disease: an Introduction to clinical medicine / Hummer G.D., McPhee S.J. - McGraw-Hill Education, 2019.

Additional:

1. A.K. Zagorulko. Short lectures on pathology. - Simferopol: 2 ed. CSMU, 2002.
2. Gozhenko A.I., Gurcalova I.P., General and clinical pathophysiology/ Study guide for medical students and practitioners. – Odesa, 2003.
3. Thomas C. Macropathology. - B.C. Decker Inc. - Toronto - Philadelphia, 1990.
4. Thomas C. Histopathology. - B.C. Decker Inc. - Toronto - Philadelphia, 198

Lector  O. Brantova.