FEDERAL STATE BUDGETARY
EDUCATIONAL INSTITUTION OF HIGHER EDUCATION
"AMUR STATE MEDICAL ACADEMY"
MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION

AGREED
Vice-Rector for Academic Affairs,

_____N.V. Loskutova

April 17, 2025

Decision of the CCMC
April 17, 2025

Protocol No. 7

APPROVED
by decision of the Academic Council of the FSBEI HE Amur SMA of the Ministry of Health of the Russian Federation
April 22, 2025

Protocol No. 15

Acting Rector of the FSBEI HE Amur SMA of the Ministry of Health of the Russian Federation

_____I.V. Zhukovets

April 22, 2025

ДОКУМЕНТ ПОДПИСАН
ЭЛЕКТРОННОЙ ПОДПИСЬЮ

Сертификат: 50AB2242604E64520B52614FA420034A
Владелец: Жуковец Ирина Валентиновна
Действителен: с 15.04.2025 до 09.07.2026

EDUCATIONAL PROGRAM

disciplines "Pathophysiology,

Clinical Pathophysiology »

Specialty: 31.05.01 General Medicine
Course: 3, 4
Semester: 5, 6, 7
Total hours: 288hrs.
Total credits: 8 credit units
Control form: examination, 6 semester
credit, 7 semester

Blagoveshchensk, 2025

The educational program of the discipline is designed in accordance with the requirements of the Federal State Educational Standard of Higher Education - specialist in specialty 31.05.01 General Medicine, approved by the order of the Ministry of Education and Science of Russia dated 08.12.2020 No. 988 (registered with the Ministry of Justice of Russia on 08.26.2020 No. 59493), BPEP HE (2021).

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Head of the Department of Hospital Therapy with a Course in Pharmacology named after Professor Yu.S. Landyshev,
Holder of an Advanced Doctorate (Doctor of Science) in Medical Sciences, Full Professor _____V.V. Voitsekhovsky

APPROVED at the meeting of the Department of Physiology and Pathophysiology,
Protocol No. 8 dated March 28, 2025

Head of Department, Holder of an Advanced Doctorate (Doctor of Sciences) in Biological Sciences, Ph.D. of Chemical Sciences, Docent,
_____T.A. Batalova
Conclusion of the Expert Commission on the review of the Educational Programs:Protocol No. 2 dated April 16, 2025

Expert of the expert commission,
Ph.D. of Engineering Sciences _____ E.A. Utochkina
APPROVED at the meeting of the CMC No. 1:
Protocol No. 7 dated April 16, 2025

Chairman of the CMC No. 1
Holder of the Advanced Doctorate (Doctor of Sciences) in Medical Sciences, Professor _____ E.A. Borodin
AGREED: Dean of the Faculty of Medicine,
Ph.D. of Medical Sciences, Associate Professor _____ N.G. Brush
April 22, 2025

CONTENT

1 . EXPLANATORY NOTE

1.1. Characteristics of the discipline.

Pathophysiology, clinical pathophysiology as a fundamental biomedical science and academic discipline studies the general patterns that determine the occurrence, course and outcome of a disease, reveals the scientific basis of etiology (causes and conditions of the occurrence of a disease), pathogenesis (mechanisms of disease development) and sanogenesis (mechanisms of recovery).

The name of the science "pathophysiology" comes from three Greek words: *pathos* - disease, suffering; *physis* - nature, origin; *logos* - science, teaching. Literally - the science that studies the nature of diseases.

Pathophysiology arose as an experimental pathology in connection with the need to study and accurately represent the origin, development and outcome of pathological processes and diseases.

The methodological basis of the subject is dialectical materialism. From the dialectical-materialistic positions, pathophysiology reveals the scientific foundations of the origin of disease, diagnosis and recovery (construction of the theory of medicine - the theory of pathology), develops models of pathological processes, diseases, as well as the principles of experimental therapy (symptomatic, etiological, pathogenetic , sanogenetic).

The methodological principles of pathophysiology are: the principle of biosocial determinism; the principles of the unity of analysis and synthesis, the unity of the organism and the external environment, the unity of structure and function; the principle of the unity of theory and practice; the principle of comparative pathology.

The object of study of pathophysiology is a disease, a pathological process. The methodological basis of pathophysiology is *experimental modeling* , with the help of which it solves its problems. Therefore, pathophysiology is often called experimental medicine.

Pathophysiology uses the following types of modeling :

- *physical* , including biological modeling – acute and chronic experiments on biological objects (various animals, humans), as well as modeling on artificial physical systems;
- *formalized modeling* , including logical (intellectual) modeling, mathematical and computer modeling.

The experiment includes modeling of pathological processes at various levels of integration of the organism (submolecular, molecular, cellular, tissue, organ, systemic, organismic). The experiment allows to expand the possibilities of understanding the essence of the pathological process, promotes the formation of clinical thinking in the doctor, the ability to use clinical knowledge in solving issues of diagnosis, treatment and prevention of various forms of pathology and diseases.

The emergence and development of new non-invasive biochemical, biophysical, electrophysiological, radioisotope and many other methods of functional diagnostic research and their application directly to the patient have led to the rapid development of a very important branch of modern pathophysiology – *clinical pathophysiology.*

Pathophysiology is closely related to other medical and biological, theoretical and medical disciplines . Pathophysiology is the theoretical basis of clinical medicine. The importance of pathophysiology as an experimental biomedical science is constantly growing, due to the expanding methodological capabilities of related disciplines and the emergence of new technologies in physics, chemistry, biology, genetics, immunology, electronics, computer technology and other areas. These achievements allow a more profound and detailed study of the functions of organs and systems in the development of a wide variety of pathological processes and diseases both when modeling them in animals and in humans.

Modern pathophysiology studies processes that occur at all levels without exception. In this regard, fundamental research is all that which elucidates and reveals the essential mechanisms and patterns of bioprocesses, regardless of the structural and functional level of the phenomena being studied, including submolecular, molecular, cellular, organ, systemic, behavioral and others.

The criterion for the fundamentality of pathophysiological research is its significance for understanding the nature and mechanisms of ongoing processes.

The task of fundamental research in pathophysiology is to establish the basic mechanisms and patterns of development of pathological processes at various structural and functional levels of research. By revealing the fundamental patterns of occurrence of pathological processes and diseases, studying changes in the body that occur in response to the action of extreme (pathogenic) stimuli, as well as in the event of a violation of the implementation of the genetic program, modern pathophysiology considers not only the role of pathogenetic, but also the included sanogenetic mechanisms in their dialectical unity.

An important achievement of pathophysiology is the development and disclosure of ideas about the endogenesis of the mechanisms of development of pathological processes, the discovery of mechanisms that arise secondarily, after the cessation of the impact of damaging factors, which are the central link in the development of pathological processes. In the development of these processes, a very important role is given to information mechanisms, carried out at various levels, including molecular, submolecular, etc.

1.2. Purpose and objectives of the discipline.

Target: mastering the academic discipline pathophysiology, clinical pathophysiology consists in forming in the student scientific knowledge about the general patterns and specific mechanisms of the occurrence, development and outcomes of pathological processes, individual diseases and disease states, about the principles of identifying pathological processes (diseases), their therapy and prevention.

Learning objectives of the discipline:

- to familiarize students with the basic concepts and modern concepts of general nosology;
- to teach the ability to conduct an analysis of scientific literature and official statistical reviews, to prepare reviews of scientific literature / abstracts on modern scientific problems; to participate in conducting statistical analysis and preparing reports on the completed research; to comply with the basic requirements of information security;
- to study the etiology, pathogenesis, principles of detection, treatment and prevention of the most socially significant diseases and pathological processes, taking into account age characteristics;
- to teach students the general patterns and mechanisms of the emergence, development and completion of pathological processes, conditions, reactions and diseases;
- to teach the ability to conduct pathophysiological analysis of data on pathological syndromes, pathological processes, forms of pathology and individual diseases;

- to teach the ability to formulate principles (algorithms, strategy) and methods for identifying, treating and preventing pathological processes, conditions, reactions and diseases;
- to teach the ability to solve individual research and applied scientific problems in the field of health care in the study of the etiology and pathogenesis, diagnosis, treatment, rehabilitation and prevention of diseases.
- to form the methodological and methodological foundations of clinical thinking and rational action of a physician.

1.3. The place of the discipline in the structure of the main professional educational program of higher education:

The discipline "Pathophysiology, clinical pathophysiology" refers to the basic part of block B1. The total workload of the discipline is 288 hours (8 credit units). Of these, 168 classroom hours, 84 hours are allocated for independent work of students. The form of control is an exam, a credit.

The basic knowledge necessary for studying the discipline is formed during the study of the disciplines:

- humanitarian, social direction (philosophy, bioethics; jurisprudence; history of medicine; Latin language);
- mathematical, natural sciences: physics, mathematics; medical informatics; chemistry; biology; biochemistry; anatomy; topographic anatomy and operative surgery; histology, embryology, cytology; normal physiology; microbiology, virology; immunology;
- professional direction: hygiene; fundamentals of life safety.

The main sections of the discipline studied:

1. General nosology.
2. Typical pathological and leading pathological processes.
3. Pathophysiology of organs and systems.
4. Clinical pathophysiology.

1.4. Requirements for students.

To study the discipline, knowledge, skills and abilities formed by previous disciplines/practices are required:
Philosophy
Knowledge: to identify the natural scientific essence of problems arising in the course of a physician's professional activity.
Skills: be able to competently and independently express, analyze the forms and methods of scientific knowledge and the laws of dialectical materialism in medicine.
Histology, embryology, cytology
Knowledge : basics of the anatomical and physiological structure of the human body.
Skills: interpret the results of histological studies of tissues in pathological processes .
Skills: viewing and evaluating blood smears.
Biochemistry.
Knowledge: biochemical processes that ensure the maintenance of vital functions of the human body
Skills: evaluate the basic biochemical parameters of the human body.
Microbiology
Knowledge: mechanisms of influence of biological (microorganisms, etc.) factors on humans .

Skills: assess the role of microorganisms in the development of human pathology.
Anatomy
Knowledge: basics of the anatomical and physiological structure of the human body.
Skills: be able to analyze the structure and establish a connection between the structural features and functions of various organs and systems of the body.
Normal Physiology
Knowledge: fundamentals of the anatomical and physiological structure of the human body.
Skills : assess the basic physiological parameters of the human body.
Skills: conduct experiments.
Immunology
Knowledge: Fundamentals of the anatomical and physiological structure of the human immune system
Skills : assess the disruption of the main links of the human immune system.

1.5. Interdisciplinary links with subsequent disciplines

No. p\p	**Name of the provided (subsequent) disciplines**	**Number of sections of this discipline required for study provided (subsequent) disciplines**			
		1	**2**	**3**	**4**
1	Propaedeutics of internal diseases	+	+	+	+
2	Epidemiology	+	+	+	+
3	Ophthalmology	+	+	+	+
4	Otorhinolaryngology	+	+	+	+
5	Dermatovenerology	+	+	+	+
6	Obstetrics and gynecology	+	+	+	+
7	Pediatrics	+	+	+	+
8	Neurology, neurosurgery	+	+	+	+
9	Psychiatry, medical psychology	+	+	+	+
10	Forensic medicine	+	+	+	+
11	Restorative therapy	+	+	+	+
12	Faculty therapy	+	+	+	+
13	Hospital therapy	+	+	+	+
14	Infectious diseases	+	+	+	+
15	Phthisiology	+	+	+	+
16	Outpatient therapy	+	+	+	+
17	General surgery	+	+	+	+
18	Anesthesiology, resuscitation, intensive care	+	+	+	+
19	Faculty surgery, urology	+	+	+	+
20	Hospital surgery, pediatric surgery	+	+	+	+
21	Dentistry	+	+	+	+
22	Oncology, radiation therapy	+	+	+	+
23	Traumatology orthopedics	+	+	+	+

24	Public health and healthcare, health economics	+	+	+	+
25	Occupational diseases	+	+	+	+
26	Endocrinology	+	+	+	+

1.6. Requirements for the results of mastering the discipline

The study of the discipline "Pathophysiology, clinical pathophysiology" is aimed at the formation/improvement of the following competencies: universal (UK), general professional (GPK)

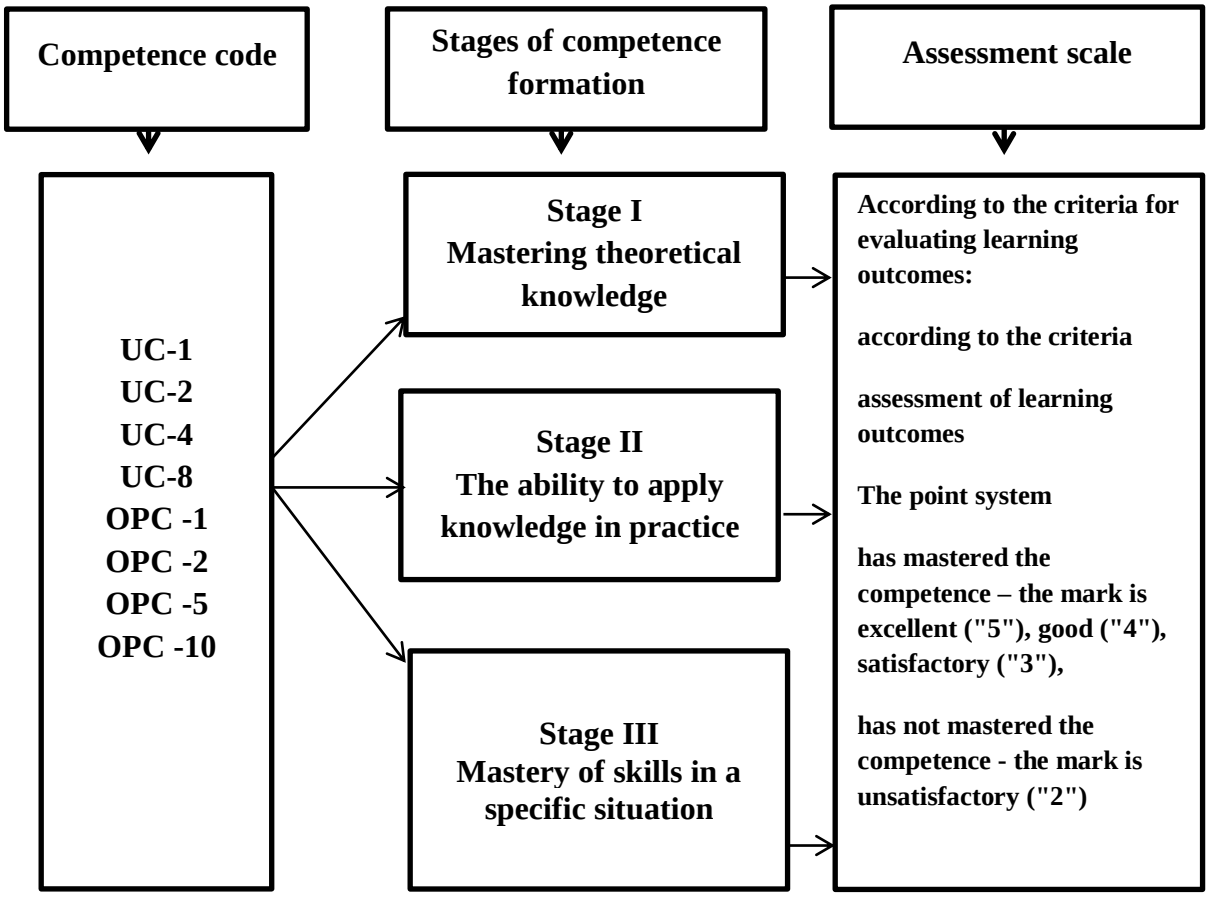
No. p/p	Code and name of competence	Code and name of the indicator of achievement of competence
Universal competencies		
1	UC-1. Capable of carrying out a critical analysis of problematic situations based on a systems approach, developing an action strategy	ID UC-1.1. Analyzes the problem situation as a system, identifying its components and the connections between them. ID UC-1.2. Identifies gaps in information needed to solve problem situations and designs processes to eliminate them. ID UC-1.3. Applies systems analysis to resolve problematic situations in the professional sphere. ID UC-1.4. Uses logical and methodological tools for critical evaluation of modern concepts of a philosophical and social nature in their subject area. ID UC-1.5. Critically evaluates the reliability of information sources, works with contradictory information from different sources.
	UC-2. Capable of managing a project at all stages of its life cycle	ID UC-2.1. Formulates, based on the stated problem, a project task and a method for solving it through the implementation of project management. ID UC-2.3. Identifies and analyzes alternative solutions to the tasks set to achieve the intended results.
	UC-4. Able to apply modern communication technologies, including in foreign language(s), for academic and professional interaction	ID UC-4.2. Uses modern communication resources to search, process and transmit information necessary for the high-quality performance of professional tasks and the achievement of professionally significant goals. ID UC-4.3. Compiles, translates from a foreign language into the state language of the Russian Federation and from the state language of the Russian Federation into a foreign language, edits various academic texts (abstracts, essays, reviews, articles, etc.). ID UC-4.4. Presents the results of academic and professional activities at various public events, including international ones, choosing the most appropriate format.
	UC-8. Capable of creating and maintaining safe living conditions in everyday life and professional activities to preserve the natural environment, ensure sustainable development of society, including in the event of a threat	ID UC-8.1. Identifies and analyzes hazardous and harmful environmental factors within the framework of professional activities. ID UC-8.2. Identifies problems related to safety violations in the workplace; suggests measures to prevent emergency situations.

	or occurrence of emergency situations and military conflicts	ID UC-8.4. Possesses skills for safe work in chemical, physical, biological laboratories and the ability to handle caustic, poisonous, volatile organic compounds, work with burners, spirit lamps and electric heating devices, animals.
General professional competencies		
2	OPC-1. Capable of implementing moral and legal norms, ethical and deontological principles in professional activities	ID OPC-1.3. Has the skills of presenting an independent point of view, analysis and logical thinking, public speaking, moral and ethical argumentation, conducting discussions and round tables, principles of medical deontology and medical ethics.
	OPC-2. Capable of conducting and monitoring the effectiveness of measures for prevention, healthy lifestyle formation and sanitary and hygienic education of the population	ID OPC-2.2. Promotes a healthy lifestyle aimed at improving sanitary culture and preventing diseases of patients (population); organizes events on sanitary and hygienic education and the formation of healthy lifestyle skills.
	OPC-5. Capable of assessing morphofunctional, physiological states and pathological processes in the human body to solve professional problems	ID OPC-5.1. Knows the functional systems of the human body, their regulation and self-regulation when interacting with the external environment in normal conditions and in pathological processes. ID OPC-5.2. Knows the etiology, pathogenesis, morphogenesis, pathomorphosis of disease development, basic concepts of nosology. ID OPC-5.3. Knows the indicators of the morphofunctional, physiological state of a healthy person and can measure/determine them. ID OPC-5.4. Uses indicators of morphofunctional, physiological state and pathological process to examine the human body in order to establish a diagnosis, prescribe treatment and monitor its effectiveness and safety. ID OPC-5.5. Analyzes and interprets macroscopic and microscopic changes in normal and pathologically altered tissues and organs
	OPC-10. Capable of solving standard tasks of professional activity using information, bibliographic resources, medical and biological terminology, information and communication technologies, taking into account the basic requirements of information security	ID OPC-10.1. Maintains confidentiality when working with information databases and with individual data of citizens. ID OPC-10.2. Carries out effective search for information necessary for solving problems of professional activity, using legal reference systems and professional pharmaceutical databases. ID OPC-10.3. Uses specialized software for mathematical processing of observational and experimental data when solving problems in the professional activities of personnel and patients of medical organizations.

1.7. Stages of competence development and descriptions of assessment scales

Sections of the discipline and the code of the competence being formed

Item No.	Section name	Code of the competence being formed
1	General nosology.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10
2	Typical pathological and leading pathological processes.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10
	Pathophysiology of organs and systems.	UK-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10
	Clinical pathophysiology.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10



1.8. Forms of training organization and types of control.

Forms of training organization: lectures, practical classes.

Teaching methods include innovative approaches and interactive technologies (computer testing and programmed control, interactive survey).

Practical classes are conducted in the form of experiments (physical, formalized), functional research methods, solving situational problems, and answering test assignments.

Work with educational literature is considered as a type of educational work in the discipline "Pathophysiology, clinical pathophysiology" and is carried out within the hours allocated for its study. Each student is provided with access to the library funds of the Academy.

Practical classes are conducted in the form of experiments (physical, formalized),

functional research methods, solving situational problems, and answering test assignments.

Types of control:

Incoming inspection.

Testing on the Moodle portal in the course "Pathophysiology, clinical pathophysiology" at the beginning of the training;

Current control .

Current monitoring is carried out systematically, in the process of students fulfilling the requirements of the curriculum and is carried out in three stages:

- entrance control of the level of preparedness of students at the beginning of studying the discipline: testing;
- initial control is carried out during an interactive survey on questions regarding preparation for classes, checking the completion of written extracurricular assignments;
- final control: control over the implementation of practical work, solving situational and computational problems, checking protocols of practical classes with an explanation of the mechanism of the processes being studied and conclusions.

Border control **.**

The discipline "Pathophysiology, clinical pathophysiology" provides for mandatory milestone tests of knowledge and competencies: **–** colloquiums (testing the acquisition of knowledge of a specific section). There are 4 colloquia in the fall (5) semester, and 4 colloquia in the spring (6) semester.

Midterm assessment – course exam and credit.

Students take a course exam on sections of general pathophysiology at the end of the 6th semester (provided that they have completed the curriculum).

The test for the section "clinical pathophysiology" is conducted in the 12th semester based on the defense of a scientific paper on the chosen topic.

The student's level of mastery of practical skills is assessed during the course of practical work.

2. STRUCTURE AND CONTENT OF THE DISCIPLINE.

2.1. Scope of the discipline and types of educational activities:

Types of educational work	Total hours	Semesters		
		5	6	12
– Lectures	48	20	14	14
– Practical classes	120	52	34	34
– Independent work of students	84	36	24	24
– Exam	36	-	36	–
– **Total labor intensity in hours**	288	108	108	72
– **Total workload in credit units**	8	3	3	2

2.2. Thematic plan of lectures and their brief content

No. p/p	Lecture topics	Codes of formed competencies	Labor intensity (hours)
1	*Introduction. Subject, tasks, sections and methods of pathophysiology. Modeling of pathological processes. Basic concepts of general nosology.* The subject and tasks of pathophysiology. The structure of the course of study in pathophysiology (general nosology, typical pathological and pathological processes, specific pathophysiology). Clinical pathophysiology. Methods of pathological physiology. Modeling in pathology. The main milestones in the history of pathophysiology. The main concepts of general nosology. The concepts of typical pathological processes, pathological processes, pathological reactions and conditions; symptom; syndrome; nosological unit. General etiology, general pathogenesis. Their relationship and dialectical essence.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
2	*The doctrine of disease* General nosology. The study of health, disease, sanogenesis, pre-disease. The importance of biological, social factors and disturbance of ecological balance in human pathology (disease criteria). Principles of disease classification; WHO classification. Disease as a dialectical unity of damage and protective-adaptive (sanogenetic) mechanisms; a systemic principle in pathology. Periods of disease and its outcomes. Complete and incomplete recovery. Remissions, relapses, complications.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
3	*Sanogenesis. Pre-disease* The concept of sanogenesis; mechanisms of sanogenesis (primary, secondary, classification) their significance. The concept of pre-disease. Terminal states. Dying as a stage process. pre-agony, agony, clinical death, biological death. Pathophysiological foundations of resuscitation.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
4	*Etiology, pathogenesis* . The concept of etiological factors and cause. The main mechanisms of occurrence of pathological processes. Pathogenic effect of environmental factors on the organism (changed atmospheric pressure, electric current, magnetic fields, ionizing radiation and other factors). Motion sickness, overloads, space medicine, weightlessness. Critical analysis of some modern concepts of general etiology (monocausalism, conditionalism, constitutionalism, etc.).	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
5	*Reactivity and resistance of the organism. Pathogenic action of external and internal environmental factors* Reactivity and resistance of the organism. Evolutionary aspects. Factors determining the reactivity of the organism. The role of reactivity in pathology. Pathological reactivity. Peculiarities of reactivity in childhood. Aging of the organism and reactivity. Ecological aspects of reactivity. Directed change in reactivity, its	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC-5, OPC-10	2

	significance. Biorhythms and their role in the formation of physiological and pathological reactivity. Chronopathology. The role of heredity and constitution in pathology. Etiology of hereditary diseases. Hereditary predisposition to diseases. Congenital diseases.		
6	*Hypoxia. Pathophysiology cells* Hypoxia. Definition and classification. Etiology and pathogenesis of the main types of hypoxia. Experimental modeling. Compensatory reactions to hypoxia. Peculiarities of age-related sensitivity to hypoxia. Cell damage. Factors causing cell damage. Typical mechanisms of cell damage and its manifestations. Disruption of the structure and function of individual cellular organelles. Changes in the receptor properties of cells. Mechanisms of cell protection and adaptation to damaging effects.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
7	*Pathophysiology of inflammation. Acute inflammation* Inflammation as a typical pathological process. Acute inflammation. Characteristics of the inflammatory process. Causes of inflammation. Classification of inflammation. Pathophysiological criteria of inflammation (the main groups of pathophysiological processes in the development of inflammation). Inflammatory mediators (primary, secondary); humoral system of mediators, cellular system of mediators. Vasoactive amines, kinin system, complement system, etc. The role of prostaglandins, leukotrienes, lipoxins, cytokines (monokines, lymphokines, interleukins	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
8	*Inflammatory mediators* Changes in the microcirculatory bed during inflammation, stages of vascular reactions, their pathogenesis. Exudation and emigration during inflammation. Phagocytosis. Types of phagocytosis, stages. Mechanisms of chemotaxis and their disorders. Adhesion, violation of adhesion mechanisms. The phenomenon of "emergency release". Mechanisms of killing microbes (oxygen-dependent and oxygen-independent). Violation of phagocytosis mechanisms. The role of microphages and macrophages in the development of inflammation. Proliferation, proliferation mechanisms, its stimulators and inhibitors	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
9	*Acute phase response. Fever. Chronic inflammation.* Inflammation. Acute phase response. Acute phase proteins. The main factors activating the synthesis of BP. Fever. The concept, general characteristics of fever. Etiology of fever; infectious and non-infectious fevers. Pyrogens, their nature, classification, sources during the infectious process, aseptic damage, during immune reactions. Primary and secondary pyrogens; leukocyte, interleukin 1,6, TNF $\alpha$and others. Stages of fever. Types of febrile reactions and the dependence of fever development on the properties of the pyrogenic factor and the reactivity of the body. Biological significance of fever, principles of antipyretic therapy. The concept of pyrotherapy. Features of a febrile reaction at an early age. Chronic inflammation. The main links in the	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2

	pathogenesis of chronic inflammation. The outcome of inflammation. Principles of anti-inflammatory therapy. Hyper- and hypothermia		
10	Typical disorders of immunological reactivity. Allergy. Immunological reactivity, immune system. Immunocompetent cells (B-lymphocytes, T-lymphocytes, NK - lymphocytes, 0-lymphocytes). Antigen-presenting cells. Interactions of cells during the immune response and disruption of the mechanisms of humoral and cellular immunity. Typical disorders of immunological reactivity. Graft-versus-host disease. Pathological tolerance. Immunodeficiency states (primary and acquired; IDS classification according to WHO). Allergy. The relationship between allergy and immunity, allergy and inflammation. Classification of allergens, their nature (allergens, distinctive features in comparison with antigens). Stages of allergic reactions. Classification of allergic reactions, types: I, II, III, IV, V. Features of their development.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
11	*Typical forms of pathology of the circulatory system. Typical forms of pathology of external respiration.* Typical forms of circulatory system pathology. Circulatory failure. Pathophysiology of hemodynamics. Compensation mechanisms. Heart failure, its forms. Mechanisms of urgent and long-term adaptation of the heart to overloads. Compensation mechanisms. Heart defects, main hemodynamic disorders in defects. Vascular dysfunction. Pathology of vascular tone. Arterial hypertension: primary hypertension (hypertension) and secondary (symptomatic hypertension); etiology, pathogenesis. Experimental models of hypertension. Arterial hypotension: acute and chronic. Atherosclerosis, causes, mechanisms of development. Pathophysiology of external respiration. General etiology and pathogenesis of external respiration disorders. Respiratory failure, types. Compensatory and adaptive processes. Obstructive and restrictive types of ventilation disorders, their causes and mechanisms. Asphyxia, its causes, stages. Dyspnea, types, development mechanisms. Periodic breathing, types, development mechanisms.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
12	*Typical forms of pathology of the red blood system* Disorders of the red blood cell system. Qualitative and quantitative disorders. Erythrocytosis. Anemia, definition of the concept, principles of classification. Etiology, pathogenesis. Blood and bone marrow picture in various types of anemia.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
13	*Typical forms of white blood cell pathology.* Pathophysiology of white blood. Leukocytosis, leukopenia, agranulocytosis, their types, causes, development mechanisms. Changes in the leukocyte formula. Concepts of nuclear shifts.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
14	*Leukemia.*	UC-1, UC-2, UC-4, UC-8, OPC-1,	2

	Leukemia. Definition of the concept. General characteristics. Classification principles. Etiology and pathogenesis of leukemia. Features of hematopoiesis and blood picture in different types of leukemia. Experimental modeling of leukemia. Leukemoid reactions, their types, etiology, pathogenesis. Difference from leukemia.	OPC-2, OPC -5, OPC-10	
15	*Typical forms of disorders in the hemostasis system* . Modern concepts of the hemostasis system, the blood anticoagulation system, the fibrinolysis system (mechanisms, their disorders). Principles of classification of hemostasis disorders. Typical disorders in the hemostasis system. Disorders of platelet-vascular mechanisms of hemostasis in thrombocytopenia, thrombocytosis, changes in the properties of platelets (hereditary and acquired forms). Vasopathies. Disorders of the coagulation mechanisms of hemostasis: hypo- and hypercoagulation. Disorders of fibrinolysis. DIC syndrome.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
16	*Typical forms of endocrine system pathology.* Pathophysiology of the endocrine system. Typical disorders. General etiology and pathogenesis of endocrine disorders. Disruption of the cortical-hypothalamic-pituitary regulation of the endocrine glands. Excess, deficiency and imbalance of releasing and inhibiting factors of the diencephalon (liberins and statins); disruption of feedback and self-regulation mechanisms in the neuroendocrine system, trans- and parapituitary mechanisms of regulatory disorders. Primary disorders of hormone synthesis in peripheral endocrine glands as a consequence of pathological processes in the gland tissue, exhaustion due to long-term hyperfunction, deficiency of components necessary for hormone synthesis, genetically determined defects in hormone biosynthesis. Iatrogenic endocrinopathies. Peripheral forms of endocrine disorders: impaired utilization of hormones, transport and metabolic disorders, blockade, absence or change in reactive properties of hormonal receptors in target cells. Main types of endocrine disorders. Hypo-, hyper-, and dysfunctional endocrinopathies, mono- and plurigenous endocrinopathies, partial and total, early and late forms.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
17	*Typical forms of pathology of the nervous system* . General etiology of nervous system disorders. General pathogenesis of nervous disorders. Neuron function disorders. Interneuronal connection disorders. Concept of pathological system. Pathology of autonomic nervous system, pathophysiology of spinal cord, basal ganglia of brainstem. Neurogenic movement disorders, hypo- and hyperkinetic states, paresis and paralysis. Myasthenia. Convulsive states, their types, mechanisms. Disorders of higher nervous activity. Neuroses. Definition of the concept and general characteristics. Neurophysiological mechanisms of neuroses. Role of typological features of nervous system in occurrence of neurotic states, role of psychoemotional stress, information overload, disturbances of normal biorhythms and other social factors,	UC-1, UC-2, UC-4, UKC-8, OPC-1, OPC-2, OPC -5, OPC-10	2

	significance of endocrine disorders, infections, intoxication. Neuroses in humans, neurasthenia, hysteria, obsessive states and phobias. Experimental neuroses, their types and mechanisms of development.		
18	*Pathophysiology of pain. Pain syndrome* . Pain as a typical response to injury. Nervous mechanisms of pain perception. Receptor, conduction and central links of the pain apparatus. Endogenous mechanisms of pain modulation. Humoral factors of pain, the role of biologically active substances, neuropeptides and other factors. Specific pain syndromes. Generator mechanisms of pain syndromes of peripheral and central origin. Principles of pain therapy.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
19	*General adaptation syndrome. Stress and its importance in pathology* Adaptation as a typical reaction of the organism to the action of an extraordinary factor for it. General and local forms of the adaptation process. Components of the development of the adaptation process. Causes of the emergence of the adaptation syndrome. Stages of the adaptation syndrome, mechanisms of development. Stress as a typical pathological process. Causes of stress. Mechanisms of development, role in the pathogenesis of human diseases. Stages and changes in the body during stress at the stages of anxiety, increased resistance, exhaustion. Types of stress reactions (stress and immunopathology, stress and cardiovascular diseases, stress and the blood system). Anti-stress mechanisms. Principles of stress reaction correction	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
20	Multiple organ failure syndrome, metabolic syndrome General characteristics of MODS and analysis of the concept of "systemic inflammatory response syndrome" (SIRS) - the pathogenetic basis of MODS. Types of MODS (etiological classification). Phases of MODS development; their general characteristics. Pathogenetic components of MODS: syndromes of "hypercatabolism", "malabsorption", "intestinal autointoxication". Enteral insufficiency syndrome and ARDS - key pathogenetic links in the pathogenesis of MODS. Cytokines and anticytokines as mediators of MODS. Principles and methods of MODS diagnostics. Treatment and preventive measures in the conditions of MODS development.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
21	*Anemic syndrome* Hematopoiesis and its disorders (primary and secondary disorders in the red and white blood system). Etiological and pathogenetic aspects of erythrocytosis, anemia. Anemic syndrome. Principles of diagnosis and correction.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
22	Leukocytosis, leukemoid reactions, leukopenia. Leukemia. Etiological and pathogenetic aspects of leukocytosis, leukemoid reactions, leukopenia, thrombocytosis, thrombocytopenia, thrombocytopathy, their classification Leukemia, principles of classification. Etiology and pathogenesis. Features of hematopoiesis processes, cellular composition of bone marrow and peripheral blood	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2

	in various types of leukemia. The main disorders in the body in leukemia, their mechanisms. Principles of diagnosis and correction.		
23	*Pathophysiology of the hemostasis system (hemorrhagic and thrombotic syndromes); DIC syndrome.* Modern concepts of the hemostasis system, fibrinolysis system and anticoagulant system (basic mechanisms and their disorders). Classification of hemostasis disorders, hemorrhagic diathesis and syndromes (coagulopathy, thrombocytopenia, thrombocytopathy, thrombocythemia, vasopathies), hereditary and acquired. Etiology and pathogenesis, principles of diagnosis and correction. DIC syndrome. Forms of DIC syndrome, etiology and pathogenesis. Basic methods of diagnosis and study of disorders in various links of hemostasis and pathogenetic correction of DIC syndrome.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPC-2, OPC -5, OPC-10	2
24	*Allergy and immunopathologies. IDS. Acquired immune deficiency syndrome.* Reactivity of the organism, immunopathology. Factors determining reactivity. Non-specific mechanisms of reactivity and resistance. Specific mechanisms of reactivity. Main forms of impaired immunological reactivity, immunodeficiencies and their classification. Allergic reactivity, classification of allergic reactions (I, II, III, IV, V types), pathogenesis, features of the course, pathophysiological principles of correction.	UC-1, UC-2, UC-4, UC-8, OPC-1, OPK-2, OPC -5, OPC-10	2
	Total		**48**

2.3. Thematic plan of practical classes and their content

No. p/p	**Name of the topics of practical classes**	**Contents of practical classes**	**Codes of formed competencies and indicators of their achievement**	**Types of control**	**Labor intensity (hours)**
1	Introduction. Subject, sections and methods of pathophysiology. Basic concepts of general nosology.	**Theoretical part:** History of the development of pathophysiology as a science and discipline, origin of the term, sections and methods of pathophysiology. Basic concepts of general nosology. Etiology and pathogenesis. Modeling of disease and pathological processes. General etiology and pathogenesis. Concept of disease, pre-disease, sanogenesis.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2.	Testing. Interactive survey. Solving situational problems.	3.06

	Etiology and pathogenesis.	**Practical part:** STUDENTS' RESEARCH WORK: *Task 1.* To study the pathogenic effect of a rarefied atmosphere on the organism of mice (experiment). *Task 2.* Study the effect of reduced atmospheric pressure on the mouse organism at normal $_{pO2}$. *Task 3.* Solve situational problems.	OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3		
2.	Reactivity. The importance of reactivity in pathology; pathogenic effect of environmental factors on the body.	**Theoretical part:** Definition of the concepts of reactivity and resistance. Forms, types of reactivity and resistance. Factors that form reactivity and resistance. Causes and direction of resistance changes in the process of phylo- and ontogenesis. Methods of changing reactivity. Pathogenic effect of environmental factors on the body (physical factors, biological, seasonal, etc.). **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* Study the characteristics of the reaction to hypoxia depending on the species of animals (experiment). *Task 2.* Study the characteristics of reactions to hypoxia depending on age (experiment). *Task 3.* To study the influence of the functional state of the central nervous system on the outcome of electrical trauma (experiment). *Task 4.* Solve situational problems.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 1 0.2, 10.3	Testing. Interactive survey. Solving situational problems.	3.06
3.	Heredity and its role in pathology.	**Theoretical part:** The role of genotype and environment in the development of pathology. Mutation and segregation as causal factors of hereditary diseases. General mechanisms of hereditary pathology, types of transmission. Chromosomal diseases. Diseases with hereditary predisposition. Multifactorial hereditary diseases. Principles of treatment and prevention of hereditary diseases and diseases with hereditary predisposition. **Practical part:**	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5..	Testing. Interactive survey. Solving situational problems.	3.06

		STUDENTS' RESEARCH WORK *Task 1.* Listen to and discuss the abstract on the topic: "Laws of population genetics and the fate of harmful mutant genes in the population", "Prospects for the use of genomics achievements in medicine". *Task 2.* Conduct a screening test to detect phenylketonuria. *Task 3.* Solve situational problems.	OPC-10 ID 10.1, 10.2, 10.3		
4	Pathophysiology of the cell.	**Theoretical part:** Causes and factors of cell damage. Specific and non-specific manifestations of damage. Dysfunction of subcellular structures, mechanisms of damage to protein molecules and nucleic acids, lipids. Membrane damage. Protective and compensatory reactions of the cell in response to damage. Outcomes of cell damage. Principles and methods of increasing the resistance of cells to the action of pathogenic factors. **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* Study the damaging effect of 2,4-dinitrophenol on autonomously living cells (experiment). *Task 2.* Study the reaction of isolated mast cells to damage (non-specific damage). Experiment. *Task 3.* Solve situational problems.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2, 5.3 , 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Frontal survey. Interactive survey. Solving situational problems.	3.06
5	Hypoxia.	**Theoretical part:** Definition of the concept of hypoxia. Classification. Etiology and pathogenesis of the main types of hypoxia. Protective and adaptive reactions in oxygen transport systems during hypoxia. Adaptive changes in the oxygen utilization system. Pathological disorders in the body during hypoxia. Factors determining different tissue sensitivity to oxygen starvation. Factors influencing the body's adaptation to hypoxia. Basic principles of correction of hypoxic conditions. **Practical part:** STUDENTS' RESEARCH WORK	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems	3.06

		Task 1. To study the development of hypoxia associated with the effect of the muscle relaxant ditilin on the animal's body (experiment). *Task 2.* Study hypoxia that develops when sodium nitrite acts on an animal's body (experiment). *Task 3.* To study the development of hypoxia that occurs when an animal's body is exposed to 2,4-dinitrophenol. *Task 4.* Solve situational problems.			
6	Colloquium No. 1	**Theoretical part:** Final lesson by sections: doctrine of disease; sanogenesis; etiology and pathogenesis; reactivity and resistance of the organism; the role of heredity in pathology; pathogenic action of environmental factors; pathophysiology of the cell; hypoxia. **Practical part:** Individual work on the computer (computer programmed control, solving situational problems). Oral dialogue on the issues of the section being studied. Interactive survey.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Computer programmed control, solving situational problems, interactive survey.	3.06
7	Typical forms of water-electrolyte metabolism disorders (edema), acid-base balance, mineral metabolism.	**Theoretical part:** Violation of water-salt metabolism (dehydration, hyperhydration), definition, classification, etiology, pathogenesis. Edema, definition, classification, etiology, pathogenesis. Pathogenesis of edema in diseases of the heart, kidneys, liver, during starvation, inflammation, allergies. Typical violations of the acid-base balance: acidosis, alkalosis (classification), etiology, pathogenesis, compensatory reactions, Violation of the metabolism of Na , K , Ca , P , Fe , Mg and other trace elements (etiology, pathogenesis, manifestation of disorders, methods for eliminating imbalance. **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* To study the role of osmotic and oncotic factors in the development of edema using frog legs (experimental study).	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems	3.06

		Task 2. Reproduce and study adrenaline pulmonary edema in a rat (experimental study). *Task 3.* Reproduce and study toxic pulmonary edema in a rat (experimental study). *Task 4.* Solve situational problems.			
8	Typical forms of carbohydrate, protein and lipid metabolism disorders; vitamin metabolism disorders.	**Theoretical part:** Characteristics of typical forms of carbohydrate metabolism disorders. Causes and mechanisms of hyper- and hypoglycemic states. Diabetes mellitus. Forms of insulin deficiency and their pathogenesis. Experimental models of diabetes mellitus. Metabolic, functional and structural disorders in diabetes mellitus, complications. Characteristics of typical disorders of protein, nucleic acid and lipid metabolism. Principles of prevention and therapy of diabetes mellitus and atherosclerosis. **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* To study the state of carbohydrate metabolism in a rabbit with experimental diabetes mellitus. *Task 2.* Reproduce hypoglycemic coma in mice in an experiment and study the prophylactic effect of glucose. *Task 3.* Solve situational problems.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems	3.06
9	Colloquium #2	**Theoretical part:** Final lesson on the sections: "Typical metabolic disorders" (pathology of water-salt, carbohydrate, protein, lipid metabolism, acid-base balance, vitamin metabolism; starvation). **Practical part:** Oral dialogue on the issues of the section being studied. Solving situational problems. Listening to and discussing abstracts prepared by students on the sections: "Pathophysiology of vitamin and microelement metabolism". Interactive survey.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Interactive survey. Solving situational problems, Assessment of the quality of abstracts, interactive survey.	3.06

10	Typical disorders of microcirculation and organ-tissue blood circulation (local circulatory disorders).	**Theoretical part:** Main forms of peripheral circulation disorders, characteristics, causes. Types and mechanisms of their development; manifestations, consequences. Microcirculation disorders, types. General principles of correction of microcirculation disorders. **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* To study the nature of circulatory disorders in the tissues of the frog tongue under local action of turpentine (experiment). *Task 2.* To study the nature of circulatory disorders in the tissues of the frog tongue when its marginal veins are ligated (experiment). *Task 3.* To study the nature of circulatory disorders in the tissues of the frog's swimming membrane when the sciatic nerve is cut (experiment). *Task 4.* Study the nature of changes in blood circulation in the tissues of the frog's swimming membrane when the peripheral segment of the sciatic nerve is irritated (experiment). *Task 5.* To study the nature of intravascular microcirculation disorders during systemic toxic action of the standard (experiment). *Task 6.* Study the nature of circulatory disorders in the vessels of the frog mesentery with local exposure of the vascular wall to a sodium chloride crystal (experiment). *Task 7.* Study the features of circulatory disorders in the vessels of the mesentery or tongue of a frog when introducing oil into the cavity of the ventricle of the heart (experiment). *Task 8.* Solve situational problems.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems	3.06
11	Typical disorders of microcirculation and organ-tissue blood circulation (local circulatory disorders).	**Theoretical part:** Definition of the concept. Etiology, pathogenesis (main groups of pathological processes, stages of inflammation). Classification. Inflammatory mediators (classification, mechanisms of action). **Practical part:** STUDENTS' RESEARCH WORK	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2.	Testing. Interactive survey. Solving situational problems	3.06

		Task 1. To study the stages of vascular reactions in acute inflammation of the mesentery of the frog intestine (Cohnheim's experiment) Experiment. *Task 2.* To study changes in vascular permeability under the influence of inflammatory mediators on the tongue of a frog (experiment). *Task 3.* Solve situational problems.	OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-1 0 ID 10.1, 10.2, 10.3		
12	Pathophysiology of inflammation (lesson 2). Phagocytosis, metabolic disorders and physicochemical shifts during inflammation.	**Theoretical part:** Changes in metabolism and physicochemical changes in the inflammation focus, their development mechanisms and consequences. Phagocytosis in inflammation, mechanisms; the role of microphages and macrophages. Reparation mechanisms. Chronic inflammation. Biological essence of inflammation. Principles of pathogenetic therapy. **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* To study the process of phagocytosis of avian erythrocytes by macrophages in the abdominal cavity of a guinea pig (experiment): a) to study the dynamics of phagocytosis (in vitro) in a "hanging drop"; b) to study the process of phagocytosis of avian erythrocytes (in vivo) by preparing and staining smears of guinea pig peritoneal exudate in the dynamics of the experiment and their microscopic examination. *Task 2.* Determine the amylolytic activity of purulent exudate (experimental study). *Task 3.* Determine the activity of catalase in purulent exudate (experimental study). *Task 4.* Determine the pH of purulent exudate (experimental study). *Task 5.* Solve situational problems.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPK-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems	3.06
13	Pathophysiology of the acute phase response. Fever. Pathophysiology of thermoregulation.	**Theoretical part:** Pyrogens, their nature, classification, sources during infectious process, aseptic damage, immune reactions. Primary and secondary pyrogens; leukocyte, interleukin 1,6, TNF $\alpha$and others. Stages of fever. Types of febrile reactions and dependence of fever development on the properties of the pyrogenic factor and the reactivity of the organism. Biological	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2.	Testing. Interactive survey. Solving situational problems	3.06

	Hyper- and hypothermia.	significance of fever, principles of antipyretic therapy. Concept of pyrotherapy. **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* Reproduce fever in a guinea pig, study the dynamics of changes in body temperature and basal metabolism. *Task 2.* Solve situational problems.	OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3		
14	Colloquium No. 3	**Theoretical part:** Final lesson by sections: local disorders of blood circulation and microcirculation; inflammation; fever **Practical part:** Individual work on the computer (computer programmed control, solving situational problems). Oral dialogue on the issues of the section being studied. Interactive survey.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Computer programmed control, solving situational problems, interactive survey.	3.06
15	Typical disorders of the body's immunological reactivity. Type I allergy . Anaphylactic shock.	**Theoretical part:** Definition of the concept of allergy, the concept of allergens, their classification. Stages of allergic reactions. The concept of sensitization, desensitization, hyposensitization. Modern classification of allergic reactions. Anaphylaxis. Anaphylactic shock, mechanisms of development. Atopy. Immunological tolerance. **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* Determine the blood clotting time in a guinea pig before and after the development of anaphylactic shock. *Task 2.* Determine the number of leukocytes in a guinea pig before and after shock. *Task 3.* Determine the number of platelets in a guinea pig before and after the development of anaphylactic shock.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPK-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems	3.06

		Task 4. Reproduce anaphylactic shock in a sensitized guinea pig in an experiment and study the dynamics of its development. *Task 5.* Solve situational problems.			
16	Allergy and immunopathology . Delayed allergy (type IV); autoallergy. Allergy testing. Immunopathology ; IDS. Allergy testing.	**Theoretical part:** Allergic reactions of type IV . Features of the stages of delayed-type allergy. The central pathogenetic link of this allergy. Allergic reactions of type V , pathogenesis. Autoallergies, primary and secondary allergens. Clinical manifestations. Immunodeficiency states (primary, secondary). Methods of testing allergic reactions. **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* Determine homocytotropic antibodies in a sensitized rabbit using an indirect reaction of mast cell or basophilic leukocyte degranulation (Shelly reaction). *Task 2.* Determine the titer of incomplete antibodies in the blood (direct Coombs test). *Task 3.* Solve situational problems.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems.	3.06
17	Colloquium No. 4.	**Theoretical part:** Final lesson on the sections of immunological reactivity, immunopathology and allergy. **Practical part:** Individual work on the computer (computer programmed control, solving situational problems). Oral dialogue on the issues of the section being studied. Interactive survey.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2, 5.3 , 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Computer programmed control, solving situational problems, interactive survey.	3.06
18	Pathophysiology of the cardiovascular system. Arrhythmias.	**Theoretical part:** Definition of the concept of arrhythmia. Pathophysiological classification of cardiac rhythm disorders. Main electrocardiographic and hemodynamic manifestations of arrhythmias. Heart failure in arrhythmias. Coronary circulation disorder; myocardial ischemia,	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4	Testing. Interactive survey.	2.13

	Myocardial infarction. (Lesson 1).	etiology, pathogenesis. Myocardial infarction, etiology, pathogenesis, manifestations on ECG. **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* Create an experimental model of cold blockade in a rat and observe changes in the ECG during the experiment. *Task 2.* Reproduce experimental myocardial necrosis in a rat and study the nature of ECG changes. *Task 3.* Solve situational problems.	OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Solving situational problems.	
19	Pathophysiology of the cardiovascular system. Heart failure. Hypertension. Hypotension. (lesson 2).	**Theoretical part:** Heart failure, definition of the concept. Forms of heart failure. Their characteristics. Hemodynamic disorders in heart failure. Compensation mechanisms. Myocardial hypertrophy, types, characteristics. Impaired vascular function. Arterial hypertension (primary, secondary), etiology, pathogenesis. Atherosclerosis, etiology, pathogenesis. Arterial hypotension. Collapse. **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* Reproduce heart failure in an experiment. Study the dynamics of ECG changes during the development of heart failure. *Task 2.* Solve situational problems.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems	2.13
20	Pathophysiology of external respiration.	**Theoretical part:** Characteristics of the concept "respiratory failure". Types, etiology, pathogenesis. Extrapulmonary and pulmonary forms of respiratory failure. Disturbance of the central regulation of breathing. Remitting forms of dyspnea. Intermittent disorders (periodic breathing). Dyspnea, types, mechanisms of development. Ventilation and diffusion forms of respiratory failure. Phyxyxia, stages, pathogenesis. Respiratory distress syndrome of adults and newborns. **Practical part:** STUDENTS' RESEARCH WORK	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems	2.13

		Task 1. Create a model of acute asphyxia in an experiment, study the stages of its development. *Task 2.* Reproduce an experimental model of periodic breathing in a frog. *Task 3.* Solve situational problems.			
21	Colloquium No. 5.	**Theoretical part:** Final lesson on the sections: "Pathophysiology of the cardiovascular system", "Pathophysiology of external respiration". **Practical part:** Individual work on the computer (computer programmed control, solving situational problems). Oral dialogue on the issues of the section being studied. Interactive survey	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Computer programmed control, solving situational problems, interactive survey.	2.13
22	Pathophysiology of digestion. Typical forms of digestive disorders in the stomach and intestines. Ulcer disease.	**Theoretical part:** General etiology and pathogenesis of digestive system disorders. Impaired reservoir, secretory and motor functions of the stomach. Types of pathological secretion. Etiology and pathogenesis of disorders of the functions of the small and large intestine. Impaired cavity and parietal digestion. Malabsorption syndrome, causes of manifestation. Peptic ulcer disease and symptomatic ulcers (etiology, pathogenesis). **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* To study the condition of the gastric mucosa and gastric secretion indices in rats during fasting. *Task 2.* To study the parietal digestion of the control segment of the animal's intestine (experimental study) *Task 3.* To study parietal digestion in case of poisoning of a segment of the intestine with sodium fluoride (experimental study) *Task 4.* Solve situational problems	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems	2.13

23	Liver pathophysiology. Jaundice. Liver failure syndrome	**Theoretical part:** General etiology of liver pathology. Liver failure, classification, pathogenesis. Syndromes in liver pathology (etiology, pathogenesis). Jaundice, types (etiology, pathogenesis). Hepatic coma. Gallstone disease (etiology, pathogenesis). **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* Determine bilirubin in the blood, determine bile pigments in the urine, examine the surface tension of urine in an animal with experimental jaundice. Based on the laboratory studies, give a conclusion about the type of jaundice model presented. *Task 2.* Investigate the effect of bile on the rhythm of cardiac activity. *Task 3.* Study the effect of bile on the speed of the motor reflex. *Task 4.* Solve situational problems.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems	2.13
24	Pathophysiology of the kidneys. Typical forms of kidney pathology. Renal failure syndromes	**Theoretical part:** Etiology and pathogenesis of disorders of the main processes in the kidneys (filtration, reabsorption, excretion and incretion). Etiology and pathogenesis of disorders of the glomeruli and tubules. Pathological components of urine of renal and extrarenal origin. Glomerulonephritis, pyelonephritis (etiology, pathogenesis). Nephrotic syndrome. Acute and chronic renal failure, uremia. Treatment principles. Nephrolithiasis, urolithiasis. Principles of conducting basic renal function tests. **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* To study the change in diuresis in a frog with mercury poisoning (experimental study). *Task 2.* To study the change in diuresis with the accumulation of nitrogenous waste in the blood (experimental study). *Task 3.* Solve situational problems.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems	2.13
25	Colloquium No. 6.	**Theoretical part:** Final lesson on the sections of pathophysiology: pathophysiology of the gastrointestinal tract, liver, kidneys.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3	Programmed control, solving situational	2.13

		Practical part: Programmed control (written assignments), solving situational problems. Oral dialogue on issues of the section being studied. Interactive survey.	UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	problems, interactive survey.	
26	Pathophysiology of the blood system (red blood PF).	**Theoretical part:** Disruption of erythropoiesis processes and its regulation (etiology, pathogenesis). General characteristics of anemia, erythrocytosis and changes in the BCC (definitions, classifications, etiology, pathogenesis). Blood and bone marrow picture in anemia (posthemorrhagic , hemolytic, iron deficiency, aplastic, B_{12} - deficiency). Practical significance of determining the number of reticulocytes and the reticulocyte index. **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* Determine hemoglobin, count the number of erythrocytes, reticulocytes, determine the color index, prepare blood smears and give a cytological assessment in a rabbit with an experimental model of anemia. *Task 2.* Based on the data obtained, provide a hematological conclusion about the type of experimental model of anemia in the examined rabbit. *Task 3.* Solve situational problems.	UC-1 ID: 1.1, 1.2, 1.3 , 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems	2.13
27	Pathophysiology of white blood cells.	**Theoretical part:** Disorders of leukopoiesis processes and its regulation. Quantitative and qualitative changes in leukocytes. Leukocytosis, leukopenia, leukemoid reactions (etiology, pathogenesis). The concept of nuclear shift, nuclear index (types of shifts, their characteristics). **Practical part:** STUDENTS' RESEARCH WORK	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5..	Testing. Interactive survey. Solving situational problems	2.13

		Task 1. Count the number of leukocytes in animals with experimental models of leukopenia and leukocytosis. *Task 2.* Prepare blood smears and examine the leukogram in experimental animals. *Task 3.* Conduct a differentiated analysis and provide a hematological conclusion for each experimental model. *Task 4.* Examine prepared blood smears with typical forms of white blood cell pathology; decipher the leukogram. *Task 5.* Solve situational problems.	OPC-10 ID 10.1, 10.2, 10.3		
28	Leukemia.	**Theoretical part:** Definition of the terms: "Leukemia", "Leukosis", "Hemoblastosis". Classification of leukemia (basic principles). Etiology, pathogenesis of leukemia, main stages of progression. Blood and bone marrow picture in acute and chronic leukemia. Basic principles of diagnostics; prognosis; principles of therapy. Distinctive features of leukemoid reactions from leukemia. **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* Examine blood smears from patients with different types of leukemia. *Task 2.* Conduct an analysis of the prepared hemograms. *Task 3.* Solve situational problems.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems.	2.13
29	Pathophysiology of the hemostasis system.	**Theoretical part:** Typical forms of hemostasis system disorders, their types and general characteristics. Hypercoagulation, thrombotic, hypocoagulation, hemorrhagic and thrombohemorrhagic conditions (etiology, pathogenesis, possible consequences). Basic methods of laboratory diagnostics of disorders of platelet-vascular and coagulation links of hemostasis. **Practical part:** STUDENTS' RESEARCH WORK	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems.	2.13

		Task 1. Conduct registration and analysis of thromboelastogram in animals with experimental liver damage (experimental study). *Task 2.* Conduct an analysis of the completed thromboelastograms; provide a conclusion. *Task 3.* Solve situational problems.			
30	Colloquium No. 7	**Theoretical part:** Final lesson on the following sections: pathophysiology of red and white blood, leukemia, pathophysiology of hemostasis. **Practical part:** Individual work on the computer (computer programmed control, solving situational problems). Oral dialogue on the issues of the section being studied. Interactive survey	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Computer programmed control, solving situational problems, interactive survey.	2.13
31	Pathophysiology of the endocrine system.	**Theoretical part:** General etiology and pathogenesis of endocrine disorders (central regulation disorders, primary disorders, extraglandular forms of endocrine disorders). Typical forms of disorders of the adenohypophysis, neurohypophysis. Partial and total insufficiency of endocrine glands. Etiology and pathogenesis of hyper- and hypofunction of endocrine glands (pituitary gland, adrenal glands, thyroid, parathyroid, sex glands), manifestations, consequences. **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* To study the reaction of the pituitary-adrenal system to stress in white rats based on the level of eosinophils in the peripheral blood. *Task 2.* To study the effect of ACTH on the level of blood eosinophils in intact rats (Thorne test). *Task 3.* Solve situational problems.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPK-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems	2.13

32	Pathophysiology of the nervous system	**Theoretical part:** Typical disorders of the nervous system (etiology, pathogenesis). Disorders of the sensory, motor and trophic functions of the nervous system. Pathogenesis of neurogenic dystrophy with damage to various parts of the nervous system. The influence of the functional state of the central nervous system on the reactivity of the body. **Practical part:** STUDENTS' RESEARCH WORK *Task 1.* To study the significance of the functional state of the central nervous system on the development and course of experimental epilepsy in laboratory animals. *Task 2.* Study the effect of alcohol on reflex activity and physical endurance of animals to static load. *Task 3.* Solve situational problems.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems	2.13
33	Colloquium No. 8	**Theoretical part:** Final lesson on sections: pathophysiology of the endocrine and nervous systems. **Practical part:** Programmed control (written assignments), solving situational problems. Oral dialogue on issues of the section being studied. Interactive survey.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Computer programmed control, solving situational problems, interactive survey.	2.13
Total hours for 5.6 semesters (3rd year)					**86**
34	Reactivity of the organism and its role in pathology. Immunopathologists I.	**Theoretical part:** Factors determining reactivity. Non-specific mechanisms of reactivity and resistance. Specific mechanisms of reactivity. Main forms of impaired immunological reactivity, immunodeficiencies and their classification. **Practical part:**	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2.	Testing. Interactive survey. Solving situational problems.	3.4

		Oral dialogue on the issues of the section being studied. Completing tasks according to the model. Working with medical and reference literature, Solving situational problems. Interactive survey	OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3		
35	Allergy.	**Theoretical part:** Allergic reactivity, classification of allergic reactions (I, II, III, IV, V types), pathogenesis, features of the course. Pathophysiological principles of correction. **Practical part:** Oral dialogue on the issues of the section being studied. Completing tasks according to the example. Working with medical and reference literature, Solving situational problems. Interactive survey.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Interactive survey. Solving situational problems.	3.4
36	Pathophysiology of pain and pain syndrome.	**Theoretical part:** Pain as a typical response to injury. Nervous mechanisms of pain perception. Receptor, conduction and central links of the pain apparatus. Endogenous mechanisms of pain modulation. Humoral factors of pain, the role of biologically active substances, neuropeptides and other factors. Specific pain syndromes. Generator mechanisms of pain syndromes of peripheral and central origin. Principles of pain therapy. **Practical part** : Programmed control (written assignments), solving situational problems. Oral dialogue on issues of the section being studied. Interactive survey.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Solving situational problems. Interactive survey.	3.4
37	Stress and general adaptation syndrome.	**Theoretical part** : Adaptation as a typical reaction of the organism to the action of an extraordinary factor for it. General and local forms of the adaptation process. Components of the development of the adaptation process. Stages of the adaptation syndrome, mechanisms of development. Stress as a typical pathological process. Causes of stress. Mechanisms of	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2.	Testing. Solving situational problems. Interactive survey.	3.4

		development, role in the pathogenesis of human diseases. Stages and changes in the body during stress at the stages of anxiety, increased resistance, exhaustion. Types of stress reaction (stress and immunopathology, stress and cardiovascular diseases, stress and the blood system). Anti-stress mechanisms. Principles of stress reaction correction. **Practical part:** Oral dialogue on the issues of the section being studied. Completing tasks according to the example. Working with medical and reference literature, Solving situational problems. Interactive survey.	OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3		
38	Blood pathophysiology. Erythrocytosis. Anemia. Anemic syndrome.	**Theoretical part:** The concept of erythrocytosis, its classification. Anemia, classification, etiology and pathogenesis. Anemic syndrome. **Practical part:** Oral dialogue on the issues of the section being studied. Completing assignments according to the model. Working with medical and reference literature, Solving situational problems. Interactive survey, listening and discussing abstracts.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Solving situational problems. Interactive survey. Estimation of abstracts	3.4
39	Blood pathophysiology. Leukocytosis, leukemoid reactions. Leukemia.	**Theoretical part:** Etiological and pathogenetic leukocytosis, leukemoid reactions, leukopenia, thrombocytosis, thrombocytopenia, thrombocytopathy, their classification, detection methods, principles of correction. Leukemia, principles of classification. Etiology and pathogenesis. Features of hematopoiesis processes, cellular composition of bone marrow and peripheral blood in various types of leukemia. The main disorders in the body in leukemia, their mechanisms. Principles of diagnosis and correction. **Practical part** : Oral dialogue on the issues of the section being studied. Completing assignments according to the model. Working with medical and	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Solving situational problems. Interactive survey. Estimation of abstracts	3.4

		reference literature, Solving situational problems. Interactive survey, listening and discussing abstracts.			
40	Pathophysiology of hemostasis (hemorrhagic and thrombotic syndromes)	**Theoretical part:** Modern concepts of the hemostasis system, fibrinolysis system and anticoagulation system (basic mechanisms and their disorders). Classification of hemostasis disorders, hemorrhagic diathesis and syndromes (coagulopathy, thrombocytopenia, thrombocytopathy, thrombocythemia, vasopathies), hereditary and acquired. Etiology and pathogenesis, principles of diagnosis and correction. **Practical part** : Oral dialogue on the issues of the section being studied. Completing assignments according to the model. Working with medical and reference literature, Solving situational problems. Interactive survey, listening and discussing abstracts.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Solving situational problems. Interactive survey. Estimation of abstracts	3.4
41	DIC syndrome.	**Theoretical part:** DIC syndrome. Forms of DIC syndrome, etiology and pathogenesis. Stages of DIC. Basic methods of diagnostics and research of disorders in various links of hemostasis and pathogenetic correction of DIC syndrome. **Practical part:** Oral dialogue on the issues of the section being studied. Completing tasks according to the model. Working with medical and reference literature, Solving situational problems. Interactive survey.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Solving situational problems. Interactive survey.	3.4
42	Multiple organ failure syndrome.	**Theoretical part:** General characteristics of MODS and analysis of the concept of "systemic inflammatory response syndrome" (SIRS) - the pathogenetic basis of MODS. Types of MODS (etiological classification). Phases of MODS development; their general characteristics. Pathogenetic components of MODS: syndromes of "hypercatabolism", "malabsorption", "intestinal autointoxication". Enteral insufficiency syndrome. Key pathogenetic links in the pathogenesis of MODS.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2., 5.3, 5.4, 5.5..	Testing. Solving situational problems. Interactive survey.	3.4

		Cytokines and anticytokines as mediators of MODS. Principles and methods of MODS diagnostics. Treatment and preventive measures in the conditions of MODS development. **Practical part:** Oral dialogue on the issues of the section being studied. Completing tasks according to the example. Working with medical and reference literature, Solving situational problems. Interactive survey.	OPC-10 ID 10.1, 10.2, 10.3		
43	Metabolic syndrome.	**Theoretical part:** The concept of metabolic syndrome. Etiology, pathogenesis. Diagnostic and treatment algorithms. **Practical part:** Oral dialogue on the issues of the section being studied. Completing tasks according to the example. Working with medical and reference literature, Solving situational problems. Interactive survey.	UC-1 ID: 1.1, 1.2, 1.3, 1.4, 1.5 UC-2 ID: 1.1, 1.3 UC-4, ID: 4.2, 4.3, 4.4. UC-8 ID: 8.1, 8.2, 8.4 OPC-2 ID: 2.2. OPC-5 ID: 5.1, 5.2, 5.3, 5.4, 5.5.. OPC-10 ID 10.1, 10.2, 10.3	Testing. Solving situational problems. Interactive survey.	3.4
Total hours for 7th semester					**34**
Total hours					**120 h.**

2.4. Interactive forms of learning

In order to activate students' cognitive activity, **interactive teaching methods** (interactive survey, computer programmed control, work in small groups), participation in the work of the pathophysiological laboratory, educational and research work of the department, and the scientific circle of the department are widely used in practical classes.

Interactive forms of conducting classes

No. p/p	Topics of practical classes, lectures	We work on the bone in hours	Interactive - form of learning	We work on the bone in hours
1	Introduction. Subject, sections and methods of pathophysiology. Basic concepts of general nosology. Etiology and pathogenesis.	3.06	Interactive survey	45 minutes (1 hour) 33.3%
2	Reactivity. The importance of reactivity in pathology; pathogenic effect of environmental factors on the body.	3.06	Interactive survey	45 minutes (1 hour) 33.3%
3	Heredity and its role in pathology.	3.06	Interactive survey	45 minutes (1 hour) 33.3%
4	Pathophysiology of the cell.	3.06	Interactive survey	45 minutes (1 hour) 33.3%
5	Hypoxia.	3.06	Interactive survey	45 minutes (1 hour) 33.3%
6	Colloquium No. 1	3.06	Computer simulations, interactive survey	115 min. (2.55 hours) 85.2%
7	Typical forms of water-electrolyte metabolism disorders (edema), acid-base balance, mineral metabolism.	3.06	Interactive survey	45 minutes (1 hour) 33.3%
8	Typical forms of carbohydrate, protein and lipid metabolism disorders; vitamin metabolism disorders.	3.06	Interactive survey	45 minutes (1 hour) 33.3%
9	Colloquium #2	3.06	Interactive survey	115 min. (2.55 hours) 85.2%
10	Typical disorders of microcirculation and organ-tissue blood circulation (local circulatory disorders).	3.06	Interactive survey	45 minutes (1 hour) 33.3%

11	Pathophysiology of inflammation (lesson 1).	3.06	Interactive survey	45 minutes (1 hour) 33.3%
12	Pathophysiology of inflammation (lesson 2).	3.06	Interactive survey	45 minutes (1 hour) 33.3%
13	Pathophysiology of the acute phase response. Fever. Pathophysiology of thermoregulation. Hyper- and hypothermia.	3.06	Interactive survey	45 minutes (1 hour) 33.3%
14	Colloquium No. 3	3.06	Computer simulations, interactive survey	115 min. (2.55 hours) 85.2%
15	Typical disorders of the body's immunological reactivity. Type I allergy . Anaphylactic shock.	3.06	Interactive survey	45 minutes (1 hour) 33.3%
16	Typical disorders of the body's immunological reactivity. Immunopathological reactions of types II , III , IV , V. Immunopathological syndromes. Allergy testing.	3.06	Interactive survey	45 minutes (1 hour) 33.3%
17	Colloquium No. 4.	3.06	Computer simulations, interactive survey	115 min. (2.55 hours) 85.2%
18	Pathophysiology of the cardiovascular system. Arrhythmias. Myocardial infarction. (Lesson 1).	2.13	Interactive survey	45 minutes (1 hour) 46.9%
19	Pathophysiology of the cardiovascular system. Heart failure. Hypertension. Hypotension. (lesson 2).	2.13	Interactive survey	45 minutes (1 hour) 46.9%
20	Pathophysiology of external respiration.	2.13	Interactive survey	45 minutes (1 hour) 46.9%
21	Colloquium No. 5.	2.13	Computer simulations, interactive survey	96 min. (2 hours) 93.75%
22	Pathophysiology of digestion. Typical forms of digestive disorders in the stomach and intestines. Ulcer disease	2.13	Interactive survey	45 minutes (1 hour) 46.9%
23	Liver pathophysiology. Jaundice. Liver failure syndrome	2.13	Interactive survey	45 minutes

				(1 hour) 46.9%
24	Pathophysiology of the kidneys. Typical forms of kidney pathology. Renal failure syndromes	2.13	Interactive survey	45 minutes (1 hour) 46.9%
25	Colloquium No. 6.	2.13	Computer simulations, interactive survey	96 min. (2 hours) 93.75%
26	Pathophysiology of the blood system (red blood PF).	2.13	Interactive survey	45 minutes (1 hour) 46.9%
27	Pathophysiology of white blood cells.	2.13	Interactive survey	96 min. (2 hours) 93.75%
28	Leukemia.	3.25	Interactive survey	45 minutes (1 hour) 46.9%
29	Pathophysiology of the hemostasis system.	2.13	Interactive survey	45 minutes (1 hour) 46.9%
30	Colloquium No. 7	2.13	Interactive survey	96 min. (2 hours) 93.75%
31	Pathophysiology of the endocrine system.	2.13	Interactive survey	96 min. (2 hours) 93.75%
32	Pathophysiology of the nervous system	2.13	Interactive survey	96 min. (2 hours) 93.75%
33	Colloquium No. 8	2.13	Interactive survey	96 min. (2 hours) 93.75%
Clinical pathophysiology				
34-35	Reactivity of the organism and its role in pathology. Immunopathology. Allergy	6.8 (3.4x2)	Interactive survey	153 min (3.4 hours) 50%
36-37	Pathophysiology of pain and pain syndrome. Stress and general adaptation syndrome.	6.8 (3.4x2)	Interactive survey	153 min (3.4 hours) 50%
38-39	Blood pathophysiology. Erythrocytosis. Anemia. Anemic syndrome. Blood pathophysiology. Leukocytosis, leukemoid reactions. Leukemia	6.8 (3.4x2)	Interactive survey	153 min (3.4 hours) 50%

40-41	Pathophysiology of hemostasis (hemorrhagic and thrombotic syndromes). DIC syndrome.	6.8 (3.4x2)	Interactive survey, business games	153 min (3.4 hours) 50%
42-43	Multiple organ failure syndrome. Metabolic syndrome.	6.8 (3.4x2)	Interactive survey, business games	153 min (3.4 hours) 50%

2.5. Criteria for assessing students' knowledge

The basis for determining the level of knowledge, skills, and abilities are the assessment criteria:

- completeness and correctness:
- correct, precise answer;
- correct but incomplete or imprecise answer;
- incorrect answer;
- no answer.

When assigning marks, the classification of errors and their quality are taken into account:

- gross errors;
- similar errors;
- minor errors;
- shortcomings.

- **Criteria for assessing learning outcomes**

No. p/p	**Topic of the practical lesson**	**Theoretical part**	**Practical part**	**Overall rating**
1-43	All practical classes	2-5	2-5	2-5
Average score		**2-5**		

- ***Rating scales for ongoing knowledge control***

The success of students in mastering the discipline "Pathophysiology, Clinical Pathophysiology", practical skills and abilities is characterized by a qualitative assessment and is assessed on a five-point scale: "5" - excellent, "4" - good, "3" - satisfactory, "unsatisfactory". The conversion of the mark into a point scale is carried out according to the following scheme:

Success rate	Mark on a 5-point scale
90-100%	"5"
80-89%	"4"
70-79%	"3"
Below 70%	"2"

- ***Working off disciplinary debts.***

If a student misses a class for a valid reason, he/she has the right to make it up and receive the maximum grade provided for by the course work program for that class. A valid reason must be documented.

If a student misses a class for an unjustified reason or receives a "2" mark for all activities in the class, he/she is required to make it up. In this case, the mark received for all activities is multiplied by 0.8.

If a student is excused from a class at the request of the dean's office (participation in sports, cultural and other events), then he is given a grade of "5" for this class, provided that he submits a report on the completion of mandatory extracurricular independent work on the topic of the missed class.

Assessment criteria for midterm assessment

1. Test control in the Moodle system

- The mark "5" - is received by the student if he demonstrates a deep and complete mastery of the content of the educational material, correctly and logically presents the answer, is able to connect theory with practice, express and substantiate his judgments, formulates independent conclusions and generalizations when answering. Has mastered all the practical skills and abilities provided for by the working program of the discipline. When testing, the percentage of correct answers is 90-100%

A student has the opportunity to receive an “excellent” grade automatically in the midterm assessment if he/she has an average current score of at least 4.8 and is a winner of the pathophysiology olympiad held by the Department of Physiology and Pathophysiology of the Federal State Budgetary Educational Institution of Higher Education Amur State Medical Academy of the Ministry of Health of Russia or similar university, interregional, and all-Russian olympiads.

- The mark "4" is received by the student if he/she has fully mastered the educational material, navigates the studied material consciously, applies knowledge to solve practical problems, correctly states the answer, but the content and form of the answer have some inaccuracies or the answer is incomplete. Has mastered all the practical skills and abilities provided by the program, but allows some inaccuracies. During testing, the percentage of correct answers is 80-89.9%.

- The mark "3" is received by the student if he/she demonstrates knowledge and understanding of the main provisions of the educational material, but presents it incompletely, inconsistently, makes inaccuracies, and is unable to substantiate his/her judgments. Possesses only some practical skills and abilities provided by the program. During testing, the percentage of correct answers is 70-79.9%.

- The mark "2" is given to a student if he/she has fragmented, unsystematic knowledge, is unable to distinguish between the main and secondary, presents the material in a disorderly and uncertain manner, and cannot apply knowledge to solve practical problems. Performs practical skills and abilities with gross errors or there was no attempt to demonstrate theoretical knowledge and practical skills. When testing, the percentage of correct answers is less than 70%

2.6. Independent work of students: in-class and out-of-class .

Independent classroom work of students.

Independent work of students in the classroom is essentially educational and research work in the classroom with specific tasks (the student must become familiar with the tasks and proposed

research methods in advance - outside of class time). All necessary information concerning this section of the work is set out in the methodological instructions.

During classroom lessons, students independently, but under the supervision of a teacher, conduct mandatory experimental studies, analyze the results of pathology models, draw up protocols, and draw conclusions. When modeling, both physical (research on biological objects or artificial physical systems) and formalized approaches (logical experiment). When performing specific practical tasks, students develop practical skills and abilities.

In order to consolidate the theoretical knowledge, practical skills and abilities acquired, students solve situational and problem tasks in pathophysiology with the inclusion of clinical and laboratory data and functional research methods that bring the students' logical and thinking activities as close as possible to the practical activities of a doctor. Computer technologies developed at the department are used.

Independent work of students under the supervision of a teacher is provided by methodological materials developed at the department, necessary equipment, reagents, experimental animals, advisory assistance from teachers, computer technologies - control environments: “ Question ` s Generator ”, “ QG System ”, control and training programs (students have two computer classes at their disposal).

Extracurricular independent work of students.

No. p/p	Topics of practical classes	Time to prepare for the lesson	Forms of extracurricular independent work of a student	
			Mandatory and the same for all students	At the student's choice
1	Introduction. Subject, sections and methods of pathophysiology. Basic concepts of general nosology. Etiology and pathogenesis.	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
2	Reactivity. The importance of reactivity in pathology; pathogenic effect of environmental factors on the body.	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
3	Heredity and its role in pathology.	3 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	Preparation of an abstract "Chromosomal abnormalities"
4	Pathophysiology of the cell.	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
5	Hypoxia.	2 hours	Reading a text (textbook, lecture, methodological	

			instructions, additional literature), solving tests, situational problems	
6	Colloquium No. 1	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
7	Typical forms of water-electrolyte metabolism disorders (edema), acid-base balance, mineral metabolism.	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
8	Typical forms of carbohydrate, protein and lipid metabolism disorders; vitamin metabolism disorders.	3 hours	2 hours. Independent study of the topic " impaired metabolism of vitamins and microelements".	Review of literature on the topic, abstract, computer presentation.
9	Colloquium No. 2	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
10	Typical disorders of microcirculation and organ-tissue blood circulation (local circulatory disorders).	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
11	Pathophysiology of inflammation (lesson 1).	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
12	Pathophysiology of inflammation (lesson 2).	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
13	Pathophysiology of the acute phase response. Fever. Pathophysiology of thermoregulation. Hyper- and hypothermia.	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	

14	Colloquium No. 3	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
15	Typical disorders of the body's immunological reactivity. Type I allergy . Anaphylactic shock.	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
16	Typical disorders of the body's immunological reactivity. Immunopathological reactions of types II , III , IV , V. Immunopathological syndromes. Allergy testing.	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
17	Colloquium No. 4.	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
18	Pathophysiology of the cardiovascular system. Arrhythmias. Myocardial infarction. (Lesson 1).	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
19	Pathophysiology of the cardiovascular system. Heart failure. Hypertension. Hypotension. (lesson 2).	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
20	Pathophysiology of external respiration.	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
21	Colloquium No. 5.	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
22	Pathophysiology of digestion. Typical forms of digestive	2 hours	Reading a text (textbook, lecture, methodological	

	disorders in the stomach and intestines. Ulcer disease		instructions, additional literature), solving tests, situational problems	
23	Liver pathophysiology. Jaundice. Liver failure syndrome	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
24	Pathophysiology of the kidneys. Typical forms of kidney pathology. Renal failure syndromes	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
25	Colloquium No. 6.	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	2.8 hours. Review of literature on the topic, abstract, computer presentation
26	Pathophysiology of the blood system (red blood PF).	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
27	Pathophysiology of white blood cells.	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
28	Leukemia.	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
29	Pathophysiology of the hemostasis system.	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
30	Colloquium No. 7	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	

31	Pathophysiology of the endocrine system.	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
32	Pathophysiology of the nervous system	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
33	Colloquium No. 8	2 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
Clinical pathophysiology				
34-35	Reactivity of the organism and its role in pathology. Immunopathology, Allergy.	3 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
36-37	Pathophysiology of pain and pain syndrome. Stress and general adaptation syndrome	3 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
38-39	Pathophysiology of blood (Anemia, erythrocytosis, leukocytosis, leukopenia, leukemoid reactions, leukemia).	3 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
40-41	Pathophysiology of hemostasis (hemorrhagic and thrombotic syndromes); DIC syndrome.	3 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
42-43	Multiple organ failure syndrome. Result – pass.	4 hours	Reading a text (textbook, lecture, methodological instructions, additional literature), solving tests, situational problems	
Labor intensity in hours			**76.2**	**7.8 hours**

Total labor intensity in hours. Total hours (pathophysiology, clinical pathophysiology)	**84 hours**

2.7. Project (research) work.

Project (research) work of students on “Pathophysiology, clinical pathophysiology” is a mandatory component of the program and is aimed at the comprehensive development of general cultural and professional competencies.

When implementing research work, students are given the opportunity to study scientific literature and information from domestic and foreign science in the relevant fields. And also - participation in conducting scientific research, collecting and analyzing scientific and technical information on specific topics and sections of pathophysiology.

Approximate topics for scientific literature reviews, abstracts:

The problem of causality in pathology.

Allergy and immunopathology.

The system of basophilic leukocytes, its regulation and role in the development of pathological processes.

The role of free radical and peroxide reactions in the pathogenesis of cell damage and human diseases.

Causes, mechanisms of development and consequences of hemostasis disorders.

Factors determining the characteristics of the course and outcome of the inflammatory process.

Etiology, general links of pathogenesis and clinical significance of immunopathological conditions.

Autoaggressive mechanisms and their role in the chronicization of acute pathological processes.

Factors causing allergic reactions and conditions predisposing to the development of allergies.

Mechanisms of disturbances of the body's anti-infective resistance in diabetes mellitus.

Causes, mechanisms of development and consequences of hypercholesterolemia .

Modern concepts of atherogenesis.

Pathogenesis of comatose states.

Synthesis of oncoproteins as a mechanism for the formation of tumor atypism.

Immune reactions of anti-neoplastic resistance of the body, causes and mechanisms of suppression of their activity during the development of malignant tumors.

Etiology, pathogenesis and features of manifestations of various types of thrombocytopathy.

Thrombocytopenia. Etiology, pathogenesis.

The role of genetic factors in the etiology and pathogenesis of hemoblastoses.

Etiology, pathogenesis, main manifestations and consequences of disseminated intravascular coagulation.

Heart failure: etiology, pathogenesis, manifestations, diagnostic methods, principles of prevention and treatment.

Cardiac arrhythmias: types, etiology, pathogenesis, consequences, principles and methods of treatment and prevention.

Ischemic heart disease: main causes, pathogenesis, manifestations, principles and methods of diagnosis, treatment and prevention.

The importance of the reperfusion phenomenon in acute coronary insufficiency.

The renin-angiotensin-aldosterone-ADH system; functioning in normal conditions, during

adaptive reactions of the body and during the development of renal arterial hypertension.

The role of the surfactant system in lung pathology.

Etiology, pathogenesis and principles of therapy of pulmonary edema.

Pathogenesis of duodenal ulcer.

Pathogenesis of gastric ulcer.

The role of immunoallergic mechanisms in the occurrence and development of kidney pathology.

Etiology and pathogenesis of "peripheral" (extra-glandular) forms of endocrine disorders.

The importance of immune autoaggressive mechanisms in the development of hypo- and hyperthyroidism.

Etiology and pathogenesis of pathological forms of pain.

Analysis of biological and social factors contributing to the development of toxicomania, drug addiction, and alcoholism.

Stress and its role in the development of pathology.

Analysis of the causes and consequences of post-resuscitation pathology, ways of its prevention and treatment.

Participation of students in scientific research conducted by the department staff in the development of a current medical and biological problem: “Mechanisms of change in the reactivity and resistance of the body, their influence on the development and course of pathological processes under conditions of extreme exposure to environmental factors; ways to increase resistance and adaptive processes, their correction (experimental studies).”

3. EDUCATIONAL, METHODOLOGICAL, MATERIAL, TECHNICAL AND INFORMATION SUPPORT OF THE DISCIPLINE :

3.1. Primary literature

1. Litvitsky, P. F. Pathophysiology: textbook / Litvitsky P. F. - Moscow: GEOTAR-Media, 2021. - 864 p. - ISBN 978-5-9704-6071-9. - Text: electronic (date accessed: 05/04/2021). - Access mode: by subscription.
http://www.studmedlib.ru/book/ISBN9785970460719.html

2. Novitsky, V. V. Pathophysiology: textbook: in 2 volumes / edited by V. V. Novitsky, O. I. Urazova. - 5th ed., revised and enlarged. - Moscow: GEOTAR-Media, 2020. - V. 1. - 896 p.: ill. add. general. - 896 p. - ISBN 978-5-9704-5721-4. - Text: electronic (date accessed: 05/04/2021). - Access mode: by subscription. http://www.studmedlib.ru/book/ISBN9785970457214.html

3. Novitsky, V. V. Pathophysiology: textbook: in 2 volumes / edited by V. V. Novitsky, O. I. Urazova. - 5th ed., revised and enlarged. - Moscow: GEOTAR-Media, 2020. - V. 2. - 592 p. : ill. - 592 p. - ISBN 978-5-9704-5722-1. - Text: electronic (date accessed: 05/06/2021). - Access mode: by subscription.
http://www.studmedlib.ru/book/ISBN9785970457221.html

3.2. Further reading

1. Litvitsky, P. F. Pathophysiology: lectures, tests, tasks: a textbook for students of higher education institutions / Litvitsky P. F., Pirozhkov S. V., Tezikov E. B. - Moscow: GEOTAR-Media, 2016. - 432 p. - ISBN 978-5-9704-3600-4. - Text: electronic (date accessed: 05/06/2021). - Access mode: by subscription. http://www.studmedlib.ru/ru/book/ISBN9785970436004.html

2. Litvitsky, P. F. Pathophysiology. Tasks and tests: a teaching aid / P. F. Litvitsky, V. A. Voynov, S. V. Pirozhkov, S. B. Bolevich, V. V. Padalko, A. A. Novikov, A. S. Sizykh; edited by P. F. Litvitsky. - Moscow: GEOTAR-Media, 2013. - 384 p. - ISBN 978-5-9704-2483-4. - Text:

electronic (date accessed: 06.05.2021). - Access mode: by subscription. http://www.studmedlib.ru/ru/book/ISBN9785970424834.html

3. Samusev, R. P. Pathophysiology. Clinical pathophysiology. Guide to practical classes / edited by Urazova O. I., Novitsky V. V. - Moscow: GEOTAR-Media, 2020. - 368 p. - ISBN 978-5-9704-5079-6. - Text: electronic (date accessed: 04.05.2021). - Access mode: by subscription. http://www.studmedlib.ru/book/ISBN9785970450796.html

4. Normal Physiology. / Edited by V.M. Smirnov - M., Publishing Center Academy, 2010, 2012. - 480 p.

3.3. Educational and methodological support for the discipline, prepared by the department staff

1. Course "Pathophysiology, Clinical Pathophysiology" on the Moodle portal https://educ-amursma.ru/course/view.php?id=157

2. Presentations in ppt program .

- Pathophysiology of microcirculation
- Pathophysiology of the infectious process
- Pathophysiology of heart failure
- Pathophysiology of arterial hyper- and hypotension
- Pathophysiology of pain syndrome
- Adaptation and stress
- Endocrinopathies
- Neuropathology

Access: by subscription https://educ-amursma.ru/course/view.php?id=157

3.4. Equipment used for the educational process

Multimedia materials (CD - R):

1. Control-training environment (program) « **QG System** ».
2. Database for programmed control in the section "General nosology. Heredity in pathology. Pathophysiology of the cell".
3. Database for programmed control in the section “Typical pathological processes and leading pathological processes”.
4. Database for programmed control "Immunopathology and allergy".
5. Database for programmed control in the sections “Pathophysiology of the cardiovascular system and respiration”.
6. Database for programmed control in the sections “Pathophysiology of blood and hemostasis”.
7. Database for programmed control of exams “Situational tasks”.

Electronic library (CD - R):

1. Electronic textbook (CD -compact disk) containing an extended version of the textbook by P.F. Litvitsky, 2007, “Pathophysiology,” which is a component of the universal and self-sufficient educational and methodological complex, “Pathophysiology.” The compact disk contains methodological recommendations for classes in pathophysiology, a medical mini-encyclopedia, color illustrations, materials on the history of pathophysiology , laboratory parameter standards, an author’s reference book, and a dictionary of stresses. Textbook – 4th ed. Revised and supplemented – M.: GEOTAR-Med., 2007.
2. Litvitsky P.F. Pathophysiology: Textbook in 2 volumes, 2003 (electronic book).
3. Litvitsky P.F. Pathophysiology: Textbook in 2 volumes, 2011 (e-book).
4. Zaychik A.Sh., Churilov L.P. Pathochemistry, 2007. (e-book).
5. .Pathophysiology: Textbook in 3 volumes / edited by A.I. Volozhin, G.V. Poryadin, 2006 (e-book).

- Presentation discs (CD - R):

1. General nosology.
2. Pathophysiology of the cell.
3. Hypoxia.
4. Reactivity of the body.
5. Violation of the main types of metabolism.
6. Pathophysiology of water-salt metabolism.
7. Pathophysiology of CBS.
8. Disorders of local blood circulation and microcirculation.
9. Inflammation.
10. Pathophysiology of thermoregulation, fever.
11. Immunopathology, IDS.
12. Allergy.
13. Pathophysiology of tissue growth.
14. Cardiac arrhythmias.
15. Heart failure.
16. Pathophysiology of vascular tone and vascular wall.
17. Pathophysiology of external respiration.
18. Pathophysiology of digestion.
19. Pathophysiology of the liver and pancreas, jaundice.
20. Pathophysiology of the kidneys.
21. Pathophysiology of blood and hematopoiesis.
22. Pathophysiology of hemostasis.
23. Pathophysiology of the endocrine system.
24. Pathophysiology of the nervous system.

List of videos, photos and video materials used in training.

Movies: "Microcirculation in norm and pathology"; "Inflammation"; "Autoallergy"; "Hay fever"; "Bronchial asthma"; "Burn disease"; "Vibration disease"; "Hyperkinesis".

To ensure the educational process of the discipline, to conduct experimental work and model pathological processes, the department has the necessary equipment and installations corresponding to the nomenclature of typical educational equipment of the departments of pathophysiology: refrigerator - 1 pc., thermostat - 1 pc., various laboratory scales - 2 pcs., various microscopes - 4 pcs., electrocardiographs - 2 pcs., a set of surgical instruments (surgical scissors, various tweezers, forceps, clamps, etc.), a set of chemical glassware (test tubes, flasks, pipettes, etc.), devices for fixing animals, a set of syringes, a set of thermometers, a centrifuge, a hemoanalyzer for blood analysis in animals, counters for deriving a leukogram, Goryaev chambers - 4 pcs., the necessary chemical reagents and preparations, dyes and other means necessary for the experimental process and conducting practical classes.

The educational process is provided by laboratory animals (mice, rats, guinea pigs, rabbits, etc.).

List of sets of tables by sections used in the educational process “Pathophysiology, clinical pathophysiology” (Author Litvitsky P.F., 2009);

Item No.; quantity	Topic title
1.1-14	general nosology, etiology and pathogenesis
2.1-15	pathogenic action of environmental factors
3.1-11	the role of environmental factors in the occurrence and development of diseases; heredity

4.1-7	the role of constitution, gender and age in pathology
5.1-8	the role of reactivity in pathology, immunological reactivity
6.1-16	allergic reactivity
7.1-7	oxygen starvation
8.1-9	shock
9.1-15	inflammation
10.1-8	fever
11.1-12	tumors
12.1-6	violation of the KShS
13.1-8	water imbalance
14.1-12	pathology of carbohydrate metabolism
15.1-7	mineral metabolism disorder
16.1-6	starvation
17.1-32	pathophysiology of the blood system and hemostasis
18.1-12	pathophysiology of blood circulation
19.1-7	pathophysiology of vascular tone
20.1-8	pathophysiology of external respiration
21.1-7	pathophysiology of digestion
22.1-11	liver pathophysiology
23.1-10	pathophysiology of the kidneys
24.1-10	pathophysiology of the endocrine system
25.1-12	pathophysiology of the nervous system
26.1-7	stress and adaptation syndrome

3.5 Professional databases, information and reference systems, electronic educational resources

No. p/p	Resource name	Resource Description	Access	Resource address
Electronic library systems				
1.	"Student Consultant" Electronic library of the medical university.	For students and teachers of medical and pharmaceutical universities. Provides access to electronic versions of textbooks, teaching aids and periodicals.	library, individual access	http: //www .studmedlib.ru/
2.	"Doctor's Consultant" Electronic Medical Library.	The materials posted in the library have been developed by leading Russian specialists based on modern scientific knowledge (evidence-based medicine). The information has been prepared taking into account the position of the scientific and practical medical society (world, European and Russian) in the relevant specialty. All materials have undergone mandatory independent review.	library, individual access	http://www.rosmedlib.ru/cgi-bin/mb4x
3.	PubMed	Free search system in the largest medical bibliographic database MedLine. Documents medical and biological	library, free access	http: //www.ncbi.nlm.nih . gov/pubmed/

		articles from specialized literature, and also provides links to full-text articles.		
4.	Oxford Medicine Online.	A collection of Oxford medical publications, bringing together over 350 titles into a single, cross-searchable resource. Publications include The Oxford Handbook of Clinical Medicine and The Oxford Textbook of Medicine, electronic versions which are constantly updated.	library, free access	http://www.oxfordmedicine.com
5.	Human Biology Knowledge Base	Reference information on physiology , cell biology , genetics , biochemistry , immunology , pathology . (Resource of the Institute of Molecular Genetics of the Russian Academy of Sciences .)		http://humbio.ru/
6.	Medical online library	Free reference books, encyclopedias, books, monographs, abstracts, English-language literature, tests.		http://med-lib.ru/
Information systems				
7.	Russian Medical Association	Professional Internet resource. Objective: to facilitate the implementation of effective professional activities of medical personnel. Contains the charter, personnel, structure, rules of entry, information about the Russian Medical Union.	library, free access	http://www.rmass.ru/
8.	Web medicine.	The site provides a directory of professional medical resources, including links to the most authoritative thematic sites, magazines, societies, as well as useful documents and programs. The site is intended for doctors, students, employees of medical universities and scientific institutions.	library, free access	http://webmed.irkutsk.ru/
Databases				
9.	World Health Organization.	The site contains news, statistics on countries that are members of the World Health Organization, fact sheets, reports, WHO publications and much more.	library, free access	http://www.who.int/ru/
10.	Ministry of Science and Higher Education of the Russian Federation.	The website of the Ministry of Science and Higher Education of the Russian Federation contains news, newsletters, reports, publications and much more.	library, free access	http://www.minobrnauki.gov.ru
11.	Ministry of Education of the Russian Federation.	The website of the Ministry of Education of the Russian Federation contains news, newsletters, reports,	library, free access	https://edu.gov.ru/

		publications and much more.		
12.	Federal portal "Russian education"	A single window for access to educational resources. This portal provides access to textbooks on all branches of medicine and health care.	library, free access	http: //www .edu.ru/ http://window.edu.ru/catalog/?prubr=2.2.81.1
Bibliographic databases				
13.	Database "Russian Medicine"	It is created in the Central Scientific and Medical Library, and covers the entire collection, starting in 1988. The database contains bibliographic descriptions of articles from domestic journals and collections, dissertations and their abstracts, as well as domestic and foreign books, collections of institute proceedings, conference materials, etc. Thematically, the database covers all areas of medicine and related areas. biology, biophysics, biochemistry, psychology, etc.	library, free access	http://www.scsml.rssi.ru/
14.	eLIBRARY.RU	Russian information portal in the field of science, technology, medicine and education, containing abstracts and full texts of more than 13 million scientific articles and publications. The eLIBRARY.RU platform provides electronic versions of more than 2,000 Russian scientific and technical journals, including more than 1,000 open access journals.	library, free access	http://elibrary.ru/defaultx.asp
15.	Portal Electronic library of dissertations	Currently, the Electronic Library of Dissertations of the Russian State Library contains more than 919,000 full texts of dissertations and abstracts.	library, free access	http://diss.rsl.ru/?menu=disscatalog/
16.	Medline.ru	Medical and biological portal for specialists. Biomedical journal. Last updated February 7, 2021.	library, free access	http://www.medline.ru

3.6. Licensed and freely distributed software used in the educational process

I. Commercial software products		
1.	Operating system MS Windows 7 Pro	License number 48381779
2.	Operating system MS Windows 10 Pro, MS Office	AGREEMENT No. 142 A dated December 25, 2019
3.	MS Office	License number: 43234783, 67810502, 67580703, 64399692, 62795141, 61350919
4.	Kaspersky Endpoint Security for Business Advanced	Agreement No. 977/20 dated 12/24/2020

5.	1C: PROF University	LICENSE AGREEMENT No. 2191 dated 15.10.2020
6.	1C: PROF Library	LICENSE AGREEMENT No. 2281 dated 11.11.2020
II. Freely distributable software		
1.	Google Chrome	Freely distributed Distribution Terms: https://play.google.com/about/play-terms/index.html
2.	Browser "Yandex"	Freely distributed License Agreement for the Use of Yandex Browser Programs https://yandex.ru/legal/browser_agreement/
3.	Dr.Web CureIt!	Freely distributed License Agreement: https://st.drweb.com/static/new-www/files/license_CureIt_ru.pdf
4.	OpenOffice	Freely distributed License: http://www.gnu.org/copyleft/lesser.html
5.	LibreOffice	Freely distributed License: https://ru.libreoffice.org/about-us/license/

3.7. Resources of the information and telecommunications network "Internet".

1. St. Petersburg Society of Pathophysiologists http://www.pathophysiology.ru/index.html
2. Research Institute of General Pathology and Pathophysiology http://niiopp.ru/about/
3. National Scientific Society of Inflammation http://www.inflammation.ru/community/
4. Film about inflammation https://www.youtube.com/watch?v=zAyOAYaIuGU
5. The department page on the academy website https://www.amursma.ru/zakrytaya-chast-sayta/3-kurs/

4. ASSESSMENT TOOLS FUND

4.1. Test tasks:
Incoming inspection
Conducted in the Moodle system
https://educ-amursma.ru/mod/quiz/view.php?id=3174
number of questions - 51
Current control
Total number of test questions for the discipline: 368
1. Etiology is
1) the doctrine of the causes and conditions of the occurrence of disease
2) the doctrine of the causes of diseases
3) the doctrine of the set of conditions that cause the occurrence of diseases
4) the doctrine of the totality of conditions that cause the prevention of diseases

2. Disease is
1) the result of the action of pathogenic factors on the body
2) reduction of the body's adaptive capabilities
3) interactions of etiological factors and the organism
4) a sharp change in the conditions of existence of the organism

3. Different types of leukocytes migrate to the site of acute purulent inflammation in the following sequence:
1) lymphocytes, monocytes, neutrophils
2) monocytes, neutrophils, lymphocytes,
3) neutrophils, monocytes, lymphocytes
4) lymphocytes, neutrophils, monocytes

Interim control
Conducted in the Moodle system
https://educ-amursma.ru/mod/quiz/view.php?id=7726
number of questions - 100

4.2. Examples of situational tasks of current control.

TASK 1.

Victim A. was taken to the surgical clinic from the scene of the car accident with multiple injuries to the chest, abdomen, legs and loss of a large amount of blood.

Objectively: consciousness is preserved, but the victim is not oriented in time and situation; skin is pale, tachycardia, "thread-like" pulse, blood pressure 65/15 mm Hg. A. an operation was performed to ligate the bleeding blood vessels, 1200 ml of donor blood (shelf life from 2 to 17 days) and 2000 ml of blood substitutes were transfused

In the intensive care unit: A.'s condition is severe; tachycardia, arterial hypotension, and dyspnea persist; daily diuresis is significantly less than normal; bleeding from small vessels of damaged tissues has occurred. Laboratory test results indicate decreased blood clotting, hypoprothrombinemia, hypofibrinogenemia, and thrombocytopenia.

On the second day, symptoms of acute renal failure developed. A. died from progressive renal and cardiovascular failure. The autopsy revealed signs of multiple thrombosis of small vessels of internal organs

Questions:

1. What pathological process developed in A.: a) soon after the injury; b) in the intensive care unit?

2. What is the pathogenesis of the pathological process that developed in the patient in the intensive care unit?

3. What are the mechanisms of development of: a) renal failure; b) cardiovascular failure in a patient?

4. Transfusion therapy was ineffective. Suggest why?

Answers:

1. a) Soon after the injury, the patient developed traumatic and posthemorrhagic shock.

b) In the intensive care unit, the patient developed DIC syndrome, which is caused by massive tissue damage and the formation of a large amount of active thromboplastin in the circulating blood.

2. The pathogenesis of DIC syndrome includes: hypercoagulation of proteins, hyperaggregation of platelets and other formed elements of the blood, consumption coagulopathy and, as a consequence, decreased coagulation of blood proteins, hypoprothrombinemia, hypofibrinogenemia and thrombocytopenia.

3. a) The mechanism of development of renal failure: formation of microthrombi in the microcirculation vessels and impaired renal function.

b) The mechanism of development of -cardiovascular failure: massive trauma, blood loss, hemorrhage, DIC syndrome, myocardial insufficiency + hypovolemia + impaired vascular tone.

4. Transfusion therapy was ineffective, presumably for one of the following reasons: - incompatible or "poor quality" (expiration date!) blood was transfused; - most likely, the transfusion of blood and plasma substitutes was performed late (since the time interval between the injury, the onset of bleeding and the operation performed is not specified); - transfusion of a relatively large volume of blood (1200 ml) of donor blood and 2000 ml of a blood substitute (polyglucin) may be accompanied by hemolysis of some erythrocytes, as well as (possibly) potentiation of thrombus formation and fibrinolysis

TASK 2.

Victim K. was delivered to the clinic 5 hours after the traffic accident. The ambulance doctor found multiple rib fractures, soft tissue contusions of the pelvis and lower extremities with the formation of extensive hematomas. At the time of admission: confusion, pale skin, thready pulse, blood pressure 60/20 mm Hg, periodic breathing. A day after intensive plasma-substituting therapy (3 liters of polyglucin and rheopolyglucin were infused) and a transfusion of 0.5 liters of blood, blood pressure rose to 110/60 mm Hg. There was no diuresis during the first day. Over the next three days, the condition remained severe.

K. complained of severe headache, dizziness, frequent, uncontrollable vomiting, general lethargy, short-term convulsions, development of subcutaneous tissue edema, bradycardia, and episodic extrasystole. Diuresis did not exceed 150–250 ml per day, blood pressure 160/90 mm Hg.

Blood analysis: residual nitrogen 90 mg%, hyperkalemia, hypermagnesemia, hyponatremia and hypochloremia, pH 7.30; urine analysis: specific gravity 1.040, slight proteinuria and cylindruria, single leukocytes in the field of vision, myoglobinuria.

On the 7th -day, K. showed an increase in diuresis (up to 2500 ml/day), an improvement in his general condition (vomiting, convulsions, headaches stopped), and the severity of edema decreased. Urine analysis: specific gravity 1.010–1.012, moderate proteinuria, a large number of granular casts.

Questions:

1. What renal syndrome did K. develop and what are its causes?

2. What are the causes of anuria during the period of shock before blood pressure is restored?

3. Why was there no restoration of diuresis after intensive transfusion therapy?

4. What are the mechanisms of development of symptoms in K. on the 2nd–4th -day after the injury?

Answers:

1. K. developed acute renal failure. The cause is traumatic shock and occlusion of the renal tubules by myoglobin (myoglobin nephrosis).

2. The causes of anuria are: - low arterial pressure in the renal glomeruli (at BP below 70 mm Hg, renal blood flow decreases by 90% or more); - increased secretion of Na+ in the tubules (as a result of a change in the position of Na+,K+ -ATPase from the basolateral position to the "tubular" position). The consequence of this is an increase in the release of renin into the blood and subsequent spasm of the renal vessels. An increase in the renin level is also due to a decrease in BP in the renal arterioles.

3. Diuresis was not restored after intensive transfusion therapy due to persistent renal ischemia ("shock kidneys"), as well as obstruction of the tubules by myoglobin (associated with epithelial detachment and blockage of the lumen of the tubules). This results in increased pressure in the interstitium and further occlusion of the tubules. In addition, increased fluid pressure in the tubules reduces the filtration rate. Together, this prevents normalization of diuresis.

4. Severe headache, dizziness, frequent (uncontrollable) vomiting, general lethargy indicate the development of cerebral edema due to impaired fluid excretion from the body. Cerebral edema is also promoted by elevated blood pressure (hypertension is typical for cerebral edema due to increased intracranial pressure). An increase in residual nitrogen in the blood, hyperkalemia and hypermagnesemia are a consequence of a decrease in the glomerular filtration rate and impaired tubular reabsorption. Hyponatremia and hypochloremia are caused by uncontrollable vomiting, which should lead to the development of hypochloremic alkalosis. However, due to the disorder of tubular function, acido- and ammoniogenesis are impaired. This led to excretory acidosis. A subsequent increase in diuresis with a reduced specific gravity of urine indicates a violation of the concentrating ability of the kidneys (reabsorption of salts, proteins and water).

TASK 3.

Identify changes in the analysis, name their possible causes and development mechanisms. Formulate a general conclusion.

The "–" sign means that the indicator was not determined or is not detected by laboratory diagnostic methods, or is absent in the given biomaterial.

	blood	**urine**	**excrement**
Total bilirubin	58 μmol/l,	-	-
Direct bilirubin	3.5 μmol/l	No	-
Urobilinogen (in)	Found in a hospital what quantity	Found in a hospital what quantity	-
Stercobilinogen (in)	Enlarged	Enlarged	increased
Bile acids	No	No	-

Conclusion:

The patient's total bilirubin level is elevated due to indirect bilirubin (58 μmol/L – 3.5 μmol/L = 54.5 μmol/L). An increase in the stercobilin level in feces and urine indicates an increased intake of direct bilirubin into the intestine.

These data allow us to say that the increase in the level of indirect bilirubin in the blood is due to a violation of its capture by hepatocytes. Increased excretion of bilirubin with bile is associated with an increased intake of indirect bilirubin. The latter is formed in excess during hemolysis of erythrocytes. High levels of urobilinogen in the blood and urine are due to an increase in its absorption in the intestine, since hepatocytes cannot completely capture it from the blood (due to saturation of its carrier with pigment). The absence of bile acids in the blood (i.e. the absence of cholemia) excludes mechanical jaundice.

General conclusion: the patient has hemolytic jaundice.

Full set of tasks – see FOS of the current certification

4.3. List of practical skills that a student should have after mastering the discipline

Control over the acquisition of practical skills and abilities is carried out during practical classes, colloquiums and course exams. Computer technology is used to solve situational problems.

Be able to:

Be able to plan and conduct (in compliance with the relevant rules) experiments on laboratory animals in accordance with the practical training program;

Be able to analyze the results of an experiment, perform simple statistical processing of digital data and draw conclusions.

Be able to prepare, stain and examine blood smears, inflammatory exudate smears, etc. using a microscope.

Be able to determine the leukocyte formula (determine the white blood cell formula) from blood smears.

Be able to determine the number of red blood cells, white blood cells, and platelets per unit volume of blood.

Be able to stain blood smears to examine reticulocytes and determine the reticulocyte count.

Be able to determine the amount of hemoglobin in the blood, color index, and reticulocyte index.

Be able to reproduce models of experimental anemia.

To be able to differentiate the main types of anemia based on ready laboratory data and blood tests and to be able to formulate a conclusion based on hemogram data about the presence and type of typical form of blood system pathology.

Be able to determine the number of eosinophils in the blood using the chamber method.

Be able to evaluate the results of the Thorne test and know the methodology for performing it.

Be able to interpret the results of basic diagnostic allergy tests.

Be able to conduct and evaluate mast cell degranulation reactions (direct, indirect).

Be able to conduct and evaluate the Coombs reaction.

Be able to examine phagocytic activity (phagocytosis by macrophages of the abdominal cavity).

Be able to reproduce an experimental model of anaphylactic shock.

Be able to reproduce an experimental model of fever.

To be able to determine the basal metabolic rate in experimental animals using indirect calorimetry.

Be able to decipher a thromboelastogram and determine the main types of hemostasis disorders based on thromboelastogram data.

Be able to register and analyze coagulogram indicators;

Be able to record ECG in various laboratory animals; determine the main types of arrhythmia and signs of ischemia based on ECG data and acute myocardial infarction.

Be able to model and differentiate different types of hypoxia.

To be able to differentiate pathological types of breathing; to determine typical forms of impaired gas exchange function of the lungs based on ventilation indicators, blood gas composition and blood flow in the lungs .

To be able to assess the acid-base balance (ABB) indicators and identify various types of its disorders;

To be able to determine typical disorders of the secretory function of the stomach and intestines based on the analysis of gastric and intestinal juice .

Be able to differentiate different types of jaundice based on biochemical parameters of blood, urine, and feces.

Be able to determine the type of febrile reaction based on the temperature curve.

To be able to characterize typical renal dysfunctions based on urine analysis and clearance test data.

To be able to identify pathological formed elements in blood smears.

Be able to solve situational problems using clinical and laboratory data. In doing so, be able to:

- conduct a pathophysiological analysis of clinical, laboratory, experimental and other data and formulate, on their basis, a conclusion about the possible causes and mechanisms of development of pathological processes (diseases);
- apply the acquired knowledge in the study of clinical disciplines and in subsequent treatment and preventive activities;

- interpret the results of the most common diagnostic methods.

To be able to analyze problems of general pathology and critically evaluate modern theoretical concepts and trends in medicine .

Own:

- skills in a systematic approach to the analysis of medical information;
- principles of evidence-based medicine based on the search for solutions using theoretical knowledge and practical skills;
- skills in analyzing the patterns of functioning of individual organs and systems in normal conditions and in pathology;
- the main methods of assessing the functional state of the human body, skills in analyzing and interpreting the results of modern diagnostic technologies
- skills in pathophysiological analysis of clinical syndromes, substantiate pathogenetic methods (principles) of diagnosis, treatment, rehabilitation and prevention of diseases.

4.4. List of questions for the exam

1. Pathophysiology as a fundamental science and academic discipline, the basis of theoretical and practical basic training of a physician. Subject, tasks, methods and sections of pathophysiology; its role in medicine.
2. The most important historical aspects of the development of world and domestic pathophysiology; pathophysiologists of the ASMA and their achievements.
3. Modeling of pathological processes and diseases is the main method of pathophysiology. Types of modeling. Possibilities and limitations of the experimental method of studying human pathology: scientific, deontological and legal aspects.
4. General nosology as a section of pathophysiology. Characteristics of the components of general nosology: the doctrine of disease, general etiology, general pathogenesis. The concept of sanogenesis, primary and secondary sanogenetic mechanisms. Tasks of nosology.
5. Characteristics of the main concepts of nosology: norm, health, disease, pre-disease, typical pathological process, pathological process, pathological reaction, typical pathological process, typical form of pathology of organs and physiological systems, pathological condition, symptom, syndrome, premorbid state.
6. Stages of the disease. Clinical and biological death. Principles of resuscitation; post-resuscitation complications. The concept of post-resuscitation disease.
7. General etiology as a section of pathophysiology. Characteristics of concepts: cause, causal factor and conditions of diseases and pathological processes. Properties of pathological factors. Etiotropic therapy and prevention.
8. Reactivity of the organism; main factors determining reactivity; typical forms of disturbance of reactivity of the organism. The role of reactivity in the occurrence and development of pathology. Methods of targeted change of reactivity.
9. General pathogenesis as a section of pathophysiology. Characteristics of concepts: trigger; main link of disease or pathological process; dynamism and chain nature of pathogenesis; vicious circle; specific and non-specific links of pathogenesis; pathogenic and adaptive reactions in the development of diseases and pathological processes. Methods of pathogenetic therapy and prevention.
10. Hereditary and congenital pathology: characteristics of concepts. Mutagens as a cause of changes in the genome. Mutations are the initial link in the pathogenesis of hereditary forms of pathology. Types of mutations.
11. Gene mutations, chromosomal aberrations, genome changes: types, mechanisms, consequences. Types of hereditary forms of pathology.
12. Genetic diseases: characteristics of the concept; types of inheritance and their main features; examples of diseases.

13. Chromosomal diseases: characteristics of the concept; types depending on changes in the structure of chromosomes, their number and the type of cells in the body.

14. Diseases with hereditary predisposition (multifactorial): types, the role of inherited and environmental factors in their origin, features of occurrence and manifestation.

15. The concept of congenital malformations: types, causes, development mechanisms, manifestations.

16. Basic methods of detection, treatment and prevention of hereditary and congenital forms of pathology.

17. Cell damage: characteristics of the concept; main causes and typical mechanisms of cell damage.

18. Typical forms of cell pathology: types, main causes, mechanisms of development, manifestations, consequences.

19. Cell death: necrosis and apoptosis, their types, causes, stages, development mechanisms, differences and significance.

20. Adaptive processes in the cell when exposed to damaging agents. Methods for increasing cell resistance to damage.

21. Inflammation, characteristics of the concept. Main causes and pathogenesis. Components of the mechanism of inflammation development, their characteristics.

22. Primary and secondary alteration in the inflammation focus: causes of occurrence, mechanisms of formation, manifestations, significance in the development of the inflammatory reaction.

23. Changes in metabolism and physicochemical shifts in the inflammation focus: causes and mechanisms of occurrence; significance in the development of inflammation.

24. Inflammatory mediators: types, origin and importance in the development of the inflammatory process.

25. Vascular reactions and changes in blood and lymph circulation in the inflammation focus: stages, mechanisms, manifestations and significance in the development of inflammation.

26. Exudation and release of formed elements of the blood into the tissue during inflammation: causes, mechanisms of development, manifestations and significance.

27. Phagocytosis: its importance in the development of the inflammatory process. Incomplete phagocytosis: causes and consequences.

28. Acute and chronic inflammation: their relationship. Causes, conditions of occurrence, manifestations and consequences. The relationship between inflammation, immunity and allergy.

29. Local and general manifestations of inflammation: causes, mechanisms of development and interrelation. BOF in inflammation. Principles of inflammation therapy.

30. Typical forms of changes in the body's thermal balance: causes, mechanisms of development, consequences.

31. Fever: characteristics of the concept, etiology. Pyrogens, their types and mechanisms of action. Difference between fever and hyperthermia.

32. Fever: stages and mechanisms of development. Temperature curve and its varieties, clinical significance.

33. Features of thermoregulation at different stages of fever. Mechanisms of stage-by-stage changes in thermal balance during fever.

34. Changes in metabolism and physiological functions during fever. The importance of fever for the body. The concept of pyrotherapy. Principles of antipyretic therapy.

35. Hyperthermic conditions: causes, stages and general mechanisms of development. Difference between exogenous hyperthermia and fever.

36. Hypothermic conditions: causes, stages and general mechanisms of development. The concept of controlled hypothermia in medicine.

37. Infectious process: characteristics of the concept, etiology, general pathogenesis, consequences, principles of therapy.

38. Typical disorders of carbohydrate metabolism. Hypo- and hyperglycemic conditions: types, causes, mechanisms of occurrence, consequences, principles of therapy.

39. Diabetes mellitus: characteristics of the concept; primary and secondary forms of diabetes, their mechanisms. Types of diabetes mellitus.

40. Etiology, pathogenesis variants and manifestations of diabetes mellitus.

41. Metabolic and functional disorders in diabetes mellitus. Complications of diabetes mellitus (acute and chronic).

42. Diabetic coma, its varieties, common links of pathogenesis and manifestations. Principles of diabetes therapy.

43. Typical disorders of protein and nucleic acid metabolism: etiology, main links, pathogenesis, manifestations. Gout: causes, mechanisms of development, manifestations.

44. Typical forms of lipid metabolism pathology: types depending on the stage of fat metabolism disorder and clinical manifestations, consequences.

45. Obesity: types, causes, mechanisms of development; significance in the occurrence of other diseases.

46. Exhaustion: types, main causes, development mechanisms, consequences.

47. Dyslipoproteinemia: types, causes, mechanisms of development, principles of treatment

48. Atherosclerosis: characteristics of the concept, etiology, stages and main links of pathogenesis, principles of therapy.

49. Typical violations of the body's water balance: their characteristics, concepts, forms.

50. Hypohydration: causes, types, development mechanisms, main manifestations, consequences, principles of elimination.

51. Hyperhydration: causes, types, development mechanisms, main manifestations, consequences, principles of elimination.

52. Edema: characteristics of the concept, types, main pathogenetic factors of their development; types of edema, their consequences for the body. Principles and methods of eliminating edema.

53. Edema in heart failure: etiology, pathogenesis and manifestations.

54. Pulmonary edema: causes, pathogenesis, manifestations, consequences.

55. Renal edema: etiology, pathogenesis, manifestations, consequences.

56. Disorders of sodium, potassium, calcium, magnesium and phosphorus metabolism: types, causes, main manifestations, consequences, methods of elimination.

57. Typical disturbances of acid-base balance: types, main indicators for assessing shifts in acid-base balance, detection methods.

58. Gaseous and non-gaseous acidoses: etiology, pathogenesis, main symptoms, consequences for the body, principles of elimination.

59. Gaseous and non-gaseous alkalosis: etiology, pathogenesis, main symptoms, consequences for the body, principles of elimination.

60. Typical forms of vitamin metabolism disorders: types, main causes, manifestations and consequences.

61. Typical forms of microelement metabolism disorders, causes, mechanisms, manifestations.

62. Hypoxia: characteristics of concepts. Types of hypoxic conditions. Metabolic and functional disorders of the body during hypoxia.

63. Hypoxia of exogenous and respiratory types: varieties, etiology, pathogenesis, characteristics of changes in gas composition and pH of arterial and venous blood. The concept of high-altitude, mountain and decompression illnesses.

64. Circulatory hypoxia: types, etiology, pathogenesis, characteristics of changes in the gas composition and pH of arterial and venous blood.

65. Hypoxia of the hemic type: types, etiology, pathogenesis, characteristics of changes in the gas composition and pH of arterial and venous blood.

66. Tissue hypoxia: etiology, pathogenesis, characteristics of changes in gas composition and pH of arterial and venous blood.

67. Substrate and overload hypoxia: etiology, pathogenesis, characteristics of changes in gas composition and pH of arterial and venous blood.

68. Adaptive reactions to hypoxia: emergency and long-term adaptation of the body; conditions of formation and mechanisms of development. Principles of elimination and prevention of hypoxia.

69. Typical disorders of the immunogenic reactivity of the organism. General etiology and pathogenesis of the main forms of immunopathological conditions and reactions.

70. Immunodeficiencies and immunodeficiency states (IDS): characteristics of concepts, types. Etiology, pathogenesis, manifestations, consequences, principles of therapy of the most common immunodeficiencies (reticular dysgenesis syndromes, Shediak-Higashi, Louis-Bar, DiGeorge; agammaglobulinemia (disease) Bruton; combined immunodeficiency of the Swiss type.

71. Pathological immune tolerance: causes, mechanisms of formation, consequences. The concept of induced (medical) tolerance.

72. Graft-versus-host disease: causes, mechanisms of development, manifestations, possible consequences.

73. Allergy: characteristics of the concept. Types of allergic reactions, their stages and common links of pathogenesis.

74. Allergic reactions of reaginic (anaphylactic, atopic) type - type I: causes, features of pathogenesis and manifestations.

75. Allergic reactions of cytotoxic (cytolytic) type - type II: causes, features of pathogenesis and manifestations.

76. Allergic reactions of the immune complex (precipitin) type - III type: causes, features of pathogenesis and manifestations.

77. Allergic reactions of tuberculin (cell-mediated, delayed) type - IV type: causes, features of pathogenesis and manifestations. V type of allergic reactions, their mechanism.

78. Principles of detection, therapy and prevention of allergies. Desensitization (hyposensitization) of the body: types, methods, possible mechanisms of desensitization.

79. Diseases and conditions of immune autoaggression: etiology, pathogenesis, manifestations.

80. Tumors: characteristics of basic concepts. Tumor etiology: main groups, specific examples of carcinogenic factors and conditions that facilitate the implementation of their action. Concepts of the stages of initiation and promotion of tumor growth.

81. The main stages and mechanisms of transformation of a normal cell into a tumor cell. The concept of oncogenes and tumor suppressors (“antioncogenes”).

82. Characteristics of tumor atypism of growth, metabolism, function, structure: mechanisms, manifestations, consequences.

83. The concept of tumor progression. Characteristics of the mechanisms of the body's antitumor defense. Principles of tumor prevention and treatment.

84. Drug addiction and substance abuse: characteristics of concepts, causes and risk factors; common links in pathogenesis and stages of development.

85. Alcoholism: risk factors, pathogenesis, stages, general signs and syndromes, treatment principles.

86. Adaptation syndrome and stress: characteristics of concepts, causes, stages, general mechanisms of development, role in the development of pathological processes. Types of stress, anti-stress mechanisms, principles of correction of stress reaction.

87. Extreme conditions: characteristics of the concept, main forms; general etiology, pathogenesis, stages, principles of therapy.

88. Shock: characteristics of the concept, types, etiology, pathogenesis, manifestations, principles of treatment.

89. Coma: characteristics of the concept, etiology, general pathogenesis, manifestations; principles of therapy of comatose states.

90. Blood volume and hematocrit disorders: oligo- and polycythemic normovolemia. Hypo- and hypervolemic states: types, causes, mechanisms of development, manifestations, consequences.

91. Acute blood loss: characteristics of the concept, types, causes, dysfunctions and adaptive reactions of the body, their stages; consequences, principles of therapy.

92. Hematopoiesis and typical disorders of the hematopoietic process.

93. Erythrocytosis: types, causes, mechanisms of development, manifestations, consequences.

94. Anemia: characteristics of the concept, types, differentiation criteria.

95. Posthemorrhagic anemia: types, causes, pathogenesis, manifestations, features of the peripheral blood picture.

96. Hemolytic anemias: types, etiology, pathogenesis, manifestations, features of the peripheral blood picture, principles of therapy.

97. Dyserythropoietic anemias: types, features of pathogenesis. B12- and/or folate-deficiency anemias: etiology, mechanisms of development, features of the peripheral blood picture.

98. Anemias developing due to iron metabolism disorders: iron deficiency and iron refractory anemias: etiology, pathogenesis, manifestations, features of the peripheral blood picture.

99. Leukopenia: characteristics of the concept, types, causes and mechanisms of occurrence, manifestations, consequences for the body.

100. Leukocytosis: characteristics of the concept, causes and mechanisms development, manifestation, consequences.

101. Changes in the leukocyte formula in leukocytosis and leukopenia; the concept of relative and absolute changes in the leukocyte formula.

102. Thrombocytosis, thrombocytopenia, thrombocytopathy: types, causes, mechanisms of development, manifestations, consequences, principles of therapy.

103. Typical forms of hemostasis system pathology: types, general characteristics. Thrombotic syndrome: main causes, development mechanisms, manifestations, consequences for the body.

104. Hemorrhagic conditions and syndromes: types, causes, general mechanisms of development, manifestations, consequences for the body.

105. Thrombohemorrhagic conditions. Disseminated intravascular coagulation (DIC) of blood: characteristics of the concept, causes, pathogenesis, stages of development, manifestations, consequences, principles of therapy.

106. Hemoblastoses: characteristics of the concept, types, tumor progression in hemoblastoses. Leukemias: definition of the concept, types, general etiology and pathogenesis, manifestations, consequences for the body.

107. Hematopoiesis disorders and features of the peripheral blood picture in acute and chronic lymphocytic and myeloleukemia; disorders in the body in them, their consequences, principles of therapy.

108. Leukemoid reactions: characteristics of the concept, causes, mechanisms of occurrence, manifestations; difference from leukemia, significance for the body.

109. Circulatory failure: characteristics of the concept, causes, types.

110. Coronary insufficiency: characteristics of the concept, types, causes, consequences, mechanisms.

111. Mechanisms of myocardial damage and changes in the main indicators of cardiac function in coronary insufficiency. Reperfusion alteration of the myocardium: causes, pathogenesis.

112. Cardiac arrhythmias: main types, causes, development mechanisms, consequences for the body.

113. Heart failure: characteristics of the concept, types, causes, general mechanisms of development, manifestations.

114. Mechanisms of compensation for decreased contractile function of the myocardium in heart failure: compensatory hyperfunction and hypertrophy of the myocardium. Pathogenesis of decompensation of the hypertrophied heart.

115.Acute and chronic heart failure: types, causes, manifestations, principles of therapy. The concept of cardiac asthma.

116.Arterial hypertension: characteristics of the concept, types, etiology, pathogenesis, manifestations, complications, principles of treatment.

117.Renal arterial hypertension (vasorenal and renoparenchymatous): types, their etiology and pathogenesis.

118.Hypertension: characteristics of the concept, etiology, stages, development mechanisms, treatment principles.

119.Arterial hypotension: characteristics of the concept, types, etiology and pathogenesis.

120.Collapse: characteristics of the concept; types, causes, development mechanisms, consequences for the body.

121.Typical disorders of regional blood flow: general characteristics. Arterial hyperemia: types, causes, mechanisms of development, manifestations and consequences.

122.Venous hyperemia: types, causes, mechanisms of development, manifestations and consequences.

123.Ischemia: characteristics of the concept, causes, mechanisms of occurrence, manifestations and consequences. The concept of embolism. Compensatory reactions in ischemia.

124.Stasis: types, causes, manifestations, consequences.

125.Microcirculation disorders: causes, typical forms. Intravascular disorders: main forms, causes, manifestations and consequences.

126.Transmural microcirculation disorders: types, causes, manifestations, consequences.

127.Extravascular microcirculation disorders: main forms, causes, manifestations and consequences.

128.Capillary-trophic insufficiency: characteristics of the concept, causes of occurrence, mechanisms of development, manifestations and consequences.

129.Sludge phenomenon: characteristics of the concept, causes, mechanisms of formation, manifestations and consequences.

130.Typical forms of external respiratory disorders: types. Alveolar hypo- and hyperventilation: types, causes, mechanisms of development, manifestations, consequences.

131.Disorders of blood circulation and ventilation-perfusion relations in the lungs; disturbances of diffusion capacity of the alveolar-capillary membrane: causes, manifestations, consequences. The concept of pulmonary hypertension.

132.Pathological forms of breathing (apneustic, gasping breathing, periodic forms): etiology, pathogenesis, clinical significance.

133.Respiratory failure: characteristics of the concept, causes, forms, manifestations, consequences. The concept of respiratory distress syndrome.

134.Typical forms of gastrointestinal tract pathology: types, general etiology. Disorders of appetite, taste, digestion in the oral cavity and swallowing: main forms, causes and mechanisms of occurrence, consequences.

135.Digestive disorders in the stomach. Typical disorders of the secretory, motor, absorption and barrier functions of the stomach: causes, consequences. The concept of dumping syndrome.

136.Digestive disorders in the intestine. Typical disorders of the digestive, motor, absorption and barrier functions of the stomach: their causes, mechanisms and consequences.

137.Peptic ulcer of the stomach and duodenum: etiology, pathogenesis, manifestations, consequences.

138.Malabsorption syndrome: main causes, pathogenesis, manifestations, consequences for the body.

139.Disorders of the exocrine function of the pancreas: causes, manifestations and consequences.

140.Liver failure: types, causes, general pathogenesis, manifestations and consequences.

141.Hepatic coma: types, etiology, pathogenesis.

142.Hemolytic jaundice: types, causes, main symptoms, consequences.

143.Hepatic (parenchymatous) jaundice: types, causes, stages, development mechanisms, main signs and consequences. The concept of enzymopathic jaundice.

144.Mechanical jaundice: causes, main signs and consequences. Acholia and cholemia: causes, signs, consequences.

145.Typical forms of kidney pathology: their causes, general pathogenesis, types. Nephrolithiasis: causes, mechanisms of development, consequences.

146.Nephritis: types, causes, pathogenesis, manifestations, consequences.

147.Pyelonephritis: characteristics of the concept, etiology, pathogenesis, manifestations, consequences.

148.Nephrotic syndrome: characteristics of the concept, causes, pathogenesis, manifestations.

149.Renal failure: causes, pathogenesis, manifestations. Uremia: causes, main links of pathogenesis, consequences.

150.Manifestations and principles of treatment of kidney pathology.

151.General etiology and general pathogenesis of endocrine disorders.

152.Typical forms of pathology of the adenohypophysis. Hypofunction of the anterior pituitary gland: types, causes, mechanisms and manifestations of disorders developing in the body, their consequences.

153.Hyperfunction of the anterior pituitary gland: types, causes, pathogenesis, manifestations, consequences.

154.Typical forms of neurohypophysis pathology: diabetes insipidus, syndrome of inappropriate secretion of ADH; causes, mechanisms and manifestations of disorders developing in the body.

155.Typical forms of adrenal pathology. Hyperfunction of the adrenal cortex: types, causes, mechanisms and manifestations of disorders developing in the body.

156.Adrenal cortex hypofunction: types, causes, mechanisms and manifestations of disorders developing in the body. Addison's disease: types, manifestations.

157.Disorders of the adrenal medulla function: types, causes, mechanisms and manifestations of disorders developing in the body.

158.Hypothyroidism: types, causes, mechanisms and manifestations of disorders developing in the body. Hypothyroid coma: causes, pathogenesis, manifestations.

159.Hyperfunction of the thyroid gland: types, causes, mechanisms and manifestations of disorders developing in the body. The concept of thyrotoxic crisis.

160.Disorders of the parathyroid glands. Hyper- and hypoparathyroid conditions: types, causes, mechanisms and manifestations of disorders developing in the body.

161.Typical forms of endocrine dysfunction of the sex glands: types, etiology, pathogenesis, manifestations.

162.General etiology, general pathogenesis and typical forms of disorders of the nervous system, their consequences for the body.

163.Typical forms of neurogenic movement disorders: types, causes, mechanisms, manifestations, consequences.

164.Typical forms of sensitivity disorders: main types, causes, mechanisms of development, manifestations and consequences.

165.Pain: causes, types, mechanisms of formation, significance for the body. Characteristics of the antinociceptive system.

166.Neurogenic trophic disorders. Causes, manifestations, consequences of neurodystrophies. The concept of denervation syndrome.

167.Neuroses: characteristics of the concept. Experimental neuroses: reproduction methods, types, manifestations.

168.Neuroses in humans: causes and conditions of occurrence, types, common manifestations. The concept of vegetoneurosis.

Topics of scientific papers for credit in the 12th semester

Block: Basic pathophysiological syndromes

1. leukemia in children
2. anemia in children
3 leukemoid reactions
4. Features of stress in children
5. pain syndrome
6. leukopenia
7. leukocytosis
8. DIC syndrome
9. allergies type 1
10. allergies type 2
11. allergies type 3
12. Allergies type 4
13. allergies type 5
16. immunodeficiencies
17. AIDS
18. diabetes mellitus
19. autoimmune processes
20 pathological tolerance
21. transplant pathology
22. Features of fever in children
23. hemorrhagic diathesis in children

APPROVED
At a department meeting
physiology and pathophysiology
Protocol No. 9 date 18.05.2026

Head of Departmen Matytsin A.P.

ADDITIONS AND CHANGES TO THE WORK PROGRAM FOR THE DISCIPLINE "PATHOPHYSIOLOGY, CLINICAL PATHOPHYSIOLOGY " SPECIALTY 31.05.01 MEDICAL CARE FOR THE 2026-2027 ACADEMIC YEAR

1. **Tables in section 3.5. "Licensed and freely distributed software used in the educational process". and state it in the following wording:**

List of software (commercial software products)

No. p / p	List of software (commercial software products)	Details of supporting documents
1.	MS operating system Windows 7 Pro	License number 48381779
2.	MS operating system Windows 10 Pro	CONTRACT No. UT-368 from September 21, 2021
3 .	MS Office	License numbers: 43234783, 67810502, 67580703, 64399692, 62795141, 61350919
4.	Kaspersky Endpoint Security for Business - Standard Russian Edition . 50-99 Node 1 year Educational Renewal License	Agreement No. 7 AA dated 02/07/2025
5.	1C Accounting and 1C Salary	LICENSE AGREEMENT 612/L dated 02.02.2022 (additional licenses)
6.	1C: PROF University	LICENSE AGREEMENT No. KrTsB-004537 dated December 19, 2023
7.	1C: PROF Library	LICENSE AGREEMENT No. 2281 dated November 11, 2020
8.	Consultant Plus	Contract No. 41AA dated December 27, 2024
9.	Contour .Tolk	Agreement No. K213753/24 dated August 13, 2024
10.	3KL e-learning environment (Russian Moodle)	Agreement No. 1362.5 dated November 20, 2024
11.	Astra Linux Common Edition	Agreement No. 142 A dated September 21, 2021
12.	Information system "Plans"	Agreement No. 2873-24 dated June 28, 2024
13.	1C: Document Management	Agreement No. 2191 dated 10/15/2020
14.	R7-Office	Agreement No. 2 KS dated 12/18/2020
15.	License for the "ROSA CHROME OS Workstation"	Agreement No. 88A dated 08/22/2024
16.	Alt Virtualization Server 10 (for secondary and higher vocational education)	Agreement No. 14AK dated September 27, 2024
17.	Dr.Web Desktop Security Suite Comprehensive Protection + Control Center for 12 months.	Agreement No. 8 dated October 21, 2024
18.	Software "Schedule for educational institutions"	Agreement No. 82A dated July 30, 2024

List of freely distributed software

No. p / p	List of freely distributed software	Links to the license agreement
1.	Yandex Browser	Freely distributed License Agreement for the Use of Yandex Browser Software : https://yandex.ru/legal/browser_agreement/

2.	Yandex.Telemost	Freely distributed License Agreement for the Use of Software https://yandex.ru/legal/telemost_mobile_agreement/
3.	Dr.Web CureIt !	Freely distributed License Agreement: https://st.drweb.com/static/new-www/files/license_CureIt_ru.pdf
4.	OpenOffice	Freely distributed License: http://www.gnu.org/copyleft/lesser.html
5.	LibreOffice	Freely distributed License: https://ru.libreoffice.org/about-us/license/
6.	VK Calls	Freely distributed https://vk.com/licence
7.	Kaspersky Free Antivirus	Freely distributed https://products.s.kaspersky-labs.com/homeuser/Kaspersky4Win2021/21.16.6.467/english-0.207.0/3830343439337c44454c7c4e554c4c/kis_eula_en-in.txt

2. The tables in Section 3.5. "Licensed and Freely Distributed Software Used in the Educational Process" and "Professional Databases, Information and Reference Systems, Electronic Educational Resources" shall be set out as follows:

Resource name	Resource Description	access	Resource address
Electronic library systems			
Student Consultant. Medical University Electronic Library	For students and faculty of medical and pharmaceutical universities. Provides access to electronic versions of textbooks, teaching aids, and periodicals.	Remote access after registration under the university profile	https://www.studentlibrary.ru/
Reference and information system " MedBaseGeotar ".	The MedBaseGeotar reference and information system is designed for practicing medical specialists, researchers, teachers, postgraduate students, residents, senior students, and healthcare managers to quickly search, select, and read the medical literature they need for their work in a single data source.	Remote access after registration under the university profile	https://mbasegeotar.ru/pages/index.html
Electronic Library System " Bookup "	A large medical library is an information and educational platform for the shared use of electronic educational and methodological publications from medical universities in Russia and the CIS countries.	Remote access after registration under the university profile	https://www.books-up.ru/
Electronic Block System "Lan"	The Network Electronic Library of Medical Universities is an electronic database of educational and scientific works on medical topics, created for the purpose of implementing network forms of professional educational programs, open access to educational materials for partner universities.	Remote access after registration under the university profile	https://e.lanbook.com/

Scientific electronic library " CyberLeninka "	CyberLeninka is a scientific electronic library built on the paradigm of open science (Open Science), whose main goals are the popularization of science and scientific activity, public oversight of the quality of scientific publications, the development of interdisciplinary research, a modern institution of scientific review, increasing the citation rate of Russian science, and building a knowledge infrastructure. It contains over 2.3 million scientific articles.	with free access	https://cyberleninka.ru/
Oxford Medicine Online	A collection of Oxford Medical Press publications, bringing together over 350 titles into a single, cross-searchable resource. Publications include The Oxford Handbook of Clinical Medicine and The Oxford Textbook of Medicine , the electronic versions of which are constantly updated.	with free access	http://www.oxfordmedicine.com
Human Biology Knowledge Base	Reference information on physiology , cell biology , genetics , biochemistry , immunology , and pathology . (Source: Institute of Molecular Genetics, Russian Academy of Sciences .)	free access	http://humbio.ru/
Medical online library	Free reference books, encyclopedias, books, monographs, essays, English-language literature, tests.	free access	https://www.medlib.ru/library/library/books
Information systems			
Clinical Guidelines Index	A resource of the Russian Ministry of Health that contains clinical guidelines developed and approved by medical professional non-profit organizations of the Russian Federation, as well as methodological manuals, nomenclatures, and other reference materials.	link to download the application	https://cr.minzdrav.gov.ru/#!/
Federal Electronic Medical Library (FEMB)	The Federal Electronic Medical Library is part of the unified state information system in the field of healthcare as a reference system . The FEMB was created on the basis of the funds of the Central Scientific Medical Library named after I.M. Sechenov.	with free access	https://femb.ru/
Russian State Library (RSL)	Collection size: approximately 3 million titles. Coverage ranges from the 10th century to the present.	Registration on the website	https:// www / rsl / ru /
Russian Medical Association	A professional online resource . Purpose: to promote effective professional activity among medical personnel. Contains the charter, personnel, structure, membership rules, and information about the Russian Medical Union.	with free access	http://www.rmass.ru/
Web medicine	The website provides a directory of professional medical resources, including links to the most authoritative specialized websites, journals, societies, as well as useful documents and programs. It is intended for physicians, students, and staff of medical universities and research institutions.	with free access	http: //webmed.irkutsk.ru/
Databases			
World Health Organization	The site contains news, statistics on countries that are members of the World Health	free access	http://www.who.int/ru/

	Organization, fact sheets, reports, WHO publications, and much more.		
Ministry of Science and Higher Education of the Russian Federation	The website of the Ministry of Science and Higher Education of the Russian Federation contains news, newsletters, reports, publications, and much more.	free access	http://www.minobrnauki.gov.ru
Ministry of Education of the Russian Federation	The website of the Ministry of Education of the Russian Federation contains news, newsletters, reports, publications, and much more.	free access	https://edu.gov.ru/
Ministry of Education of the Russian Federation	The website of the Ministry of Education of the Russian Federation contains news, newsletters, reports, publications, and much more.	free access	https://edu.gov.ru/
Polpred.com	Electronic library system Business media. Media review	free access	https://polpred.com/news
Biographical databases			
Database "Russian Medicine"	Created at the Central Scientific and Methodological Library, it covers the entire collection since 1988. The database contains bibliographic descriptions of articles from Russian journals and collections, dissertations and their abstracts, as well as Russian and foreign books, institute proceedings, conference materials, etc. Thematically, the database covers all areas of medicine and related fields of biology, biophysics, biochemistry, psychology, etc.	free access	https://rucml.ru/
PubMed	A text database of medical and biological publications in English. PubMed is an electronic search engine with free access to 30 million publications from 4,800 indexed medical journals. The database contains articles published from 1960 to the present, including information from MEDLINE, PreMEDLINE , and NLM. Each year, the portal is updated with more than 500,000 new papers.	free access	https :// pubmed . ncbi . nlm . nih . gov /
eLIBRARY.RU	A Russian information portal in science, technology, medicine, and education, containing abstracts and full texts of over 13 million scientific articles and publications. The eLIBRARY.RU platform offers electronic versions of over 2,000 Russian scientific and technical journals, including over 1,000 open-access journals.	Full functionality of the site is available after registration.	http://elibrary.ru/defaultx.asp
Electronic library of dissertations (RSL)	Currently, the Electronic Library of Dissertations of the Russian State Library contains more than 919,000 full texts of dissertations and abstracts.	free access	http://diss.rsl.ru/?menu=disscatalog/
Medline .r u	Medical and biological portal for specialists. Biomedical journal.	with free access	https://journal.scbmt.ru/jour/index
Official Internet portal of legal information	The single official state information and legal resource in Russia	free access	http://pravo.gov.ru/