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

April22, 2025

Decision of the CCMC
April17, 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

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EDUCATIONAL PROGRAM

discipline "Functional Diagnostics"

Specialty: 31.05.01 General Medicine
Course: 5
Semester: 10
Total hours: 72 hrs.
Total credits. 2 credit units
Control form: credit-test, 10 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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Conclusion of the Expert Commission on the review of the Educational Programs:
Protocol No. 1 dated April 16, 2025
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APPROVED at the meeting of the CMC No. 3:
Protocol No. 6 dated April 17, 2025

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April 17, 2025

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SECTION 1. EXPLANATORY NOTE

1.1. Characteristics of the discipline

Functional diagnostics is a section of modern medical practice, the content of which is the objective assessment, detection of deviations and determination of the degree of impairment of the function of various organs and systems of the body on the basis of measuring objective indicators of their activity with the help of instrumental studies. The most common methods used for these purposes are electrocardiography, spirography, Holter monitoring with and without blood pressure, pneumotachometry, electroencephalography and many others.

Nowadays, technically more and more complex methods of research of external respiration, blood circulation and central nervous system functions are used. Functional diagnostics is one of the rapidly developing areas of modern medicine. Active introduction of high-tech research methods and computer technology fully contributes to the rapid development of functional diagnostics. Creation of more qualitative and modern equipment, improvement of traditional and creation of new methods of research of human organism lead to increase of the role of functional diagnostics in diagnostic sphere of medicine. Since it is always easier to cure a disease if it is detected at an early stage, functional diagnostics can be safely attributed the role of the future of medicine in general.

Functional diagnostics is the key to understanding the mechanisms of disease development, determining the adaptive capabilities of the body and its individual functional systems.

An essential feature of the subject is the lack of unambiguous interpretation of the results obtained by functional methods, since each organism is unique and there is no uniform norm for all. It is necessary to conduct studies in different conditions and compare the results of repeated examinations of one person, to take into account the totality of factors that may affect the functions under study. For this purpose, it is necessary a large enough volume of knowledge and skills.

The working program of the discipline of choice “Functional Diagnostics” is aimed at studying the functional features of the organs of cardiovascular and respiratory systems, methods of examination of patients with heart and lung diseases, including their practical implementation and interpretation of the results obtained. The study of this discipline provides for the development of students' professional skills to perform basic methods of research of cardiovascular and bronchopulmonary systems and interpretation of the results obtained. This will contribute to the clarification of clinical diagnosis and clarification of the treatment plan for each specific patient.

Classes on the discipline “Functional Diagnostics” are held in 10 semester: 10 clinical practical classes and 14 hours of lectures.

1.2. Aims and objectives of the discipline

The purpose of teaching the discipline - deepening of basic knowledge and formation of systemic knowledge of functional methods of research of cardiovascular and respiratory systems of the body, the ability to generalize and apply the knowledge in practice using modern possibilities of functional diagnostics.

Learning Objectives of the Discipline:

To promote the formation of professional skills of functional examination of the patient in senior students, to teach students:

1. Understand the peculiarities of physiology of cardiovascular and respiratory system organs in various pathological processes;
2. Make a plan of functional examination of cardiologic and pulmonologic patients depending on the nature of the main and concomitant diseases and their complications;
3. To master the basic methods of functional examination of the mentioned systems;
4. Correctly interpret the results of the main methods of functional examination of cardiologic and pulmonologic patients;
5. Correctly recommend additional methods of functional examination of patients with various heart and lung diseases, taking into account the complexity of the diagnostic search, the presence of indications and contraindications to the implementation of these techniques;

6. Correctly interpret the obtained data of additional methods of functional examination of cardiologic and pulmonologic patients;
7. Pay close attention to additional signs of emergency conditions in cardiology and pulmonology;
8. Formulate an adequate conclusion on the basis of the data obtained during the performance of various methods of functional diagnostics;
9. Compare the obtained data with the clinical picture of the disease and formulate a complete clinical diagnosis.

1.3. Place of the discipline in the structure of the basic professional educational program of higher education of the basic professional educational program of higher education

In accordance with the Federal State Educational Standard of Higher Education - specialist in specialty 31.05.01 General Medicine (2020), the discipline "Functional Diagnostics" refers to the variable part (elective discipline), Block 1. The total workload is 2 credits (72 hours), taught in the 10th semester in the 5th year. Form of control - credit-test in the 10th semester.

1.4. Student Requirements

To study the discipline requires knowledge, skills and abilities, formed by previous disciplines:
Professional foreign language
Knowledge: basic medical and pharmaceutical terminology in a foreign language.
Skills: apply knowledge to communicate and obtain professional information from foreign sources.
Abilities: application of language skills to communicate and obtain professional information from foreign sources.
Histology, Embryology, Cytology
Knowledge of: histologic structure of cardiovascular tissues in the aspect of influence on electrophysiologic properties of the heart (II-III level)
Skills: explain the relationship of ECG changes with innervation and blood supply of the heart, structure of cardiomyocytes and cells of the conducting system
Abilities: explaining the pathogenesis of ECG changes with features of the structure, innervation and blood supply of the heart
Physics, mathematics
Knowledge of: mathematical methods of solving intellectual problems and their application in medicine; theoretical foundations of informatics, search, storage, processing, transformation and dissemination of information in medical systems; use of information computer systems in medicine and health care; principles of operation and devices of equipment used in medicine, basic physical fundamentals of methods used in functional diagnostics.
Skills: to use electronic systems of search of educational and scientific literature, to use programs of storage of medical information, programs of medical statistics, to work with electrical equipment taking into account safety rules.
Abilities: use of electronic systems of search of educational and scientific literature, use of programs of storage and search of medical documentation, programs of medical statistics, work with electrocardiograph taking into account the safety rules
Biology
Knowledge of: laws of genetics and their importance for medicine, laws of heredity and variability in individual development as a basis for scientific understanding of the pathogenesis of hereditary and multifactorial cardiologic diseases (II-III level).
Skills: analyze the role of heredity and variability in the development of heart disease, in particular, heart rhythm disorders
Abilities: analyze the role of hereditary factors and multifactorial mechanisms in the development

of the studied pathological conditions of heart and vessels
Normal Physiology
Knowledge of: synaptic connections at the level of heart and vessels and cardiac electrophysiology (II-III level)
Skills: analyze the importance of regulation of biological processes in the body for the functioning of the cardiovascular system
Abilities: analyze the state of regulation of cardiac muscle functions and electrophysiological processes in it and the conduction system of the heart in the studied conditions
Pathophysiology
Knowledge: morphological changes of body tissues in the pathology of cardiovascular and respiratory systems (II level).
Skills: determine the contribution of pathophysiological processes in the development of cardiac pathology and its signs on the ECG
Abilities: indicating possible causes of ECG changes in a particular pathologic condition under study from the point of view of pathophysiology
Propaedeutic of internal diseases
Knowledge: methods of collecting complaints and clarifying the history of the disease, physical examination of the patient with pathology of the heart and blood vessels (II-III level).
Skills: to collect complaints and anamnesis, physical examination of the patient, to identify the main clinical syndromes of heart diseases, to interpret the obtained data in conjunction with the results of additional methods of functional and laboratory diagnostics.
Ability: to examine a patient with cardiovascular disease, taking into account all canons of internal medicine, to determine the diagnosis of the disease, taking into account the examination data and additional diagnostic methods.
Emergency conditions in Therapy
Knowledge: etiology, pathogenesis, classifications, clinical manifestations, complications, diagnosis, treatment and prevention of emergency conditions in cardiology (II-III level).
Skills: diagnose the main urgent conditions in cardiology and pulmonology, formulate and justify the clinical diagnosis, conduct their differential diagnosis and provide emergency care.
Abilities: diagnosis of emergency conditions in cardiology - acute myocardial infarction and its complications, rhythm and conduction disorders, differential diagnosis and emergency care of patients with these changes, taking into account ECG data.
Faculty Therapy
Knowledge: etiology, pathogenesis, classifications, clinical manifestations, complications, principles of diagnosis, treatment and prevention of major diseases of the cardiovascular system (II-III level).
Skills: to identify and explain ECG signs of the studied heart diseases, to prescribe additional functional methods of examination necessary for their confirmation, to formulate a clinical diagnosis of diseases taking into account the obtained data
Ability to: identify and explain the essence of ECG changes detected in patients with the studied heart diseases, prescribe additional functional examination methods necessary to confirm the diagnosis, formulate a clinical diagnosis of the disease taking into account the obtained data
Polyclinic Therapy
Knowledge: etiology, pathogenesis, classifications, clinical manifestations, complications, principles of diagnosis, treatment and prevention of major diseases of the cardiovascular system (II-III level).
Skills: to identify and explain ECG signs of the studied heart diseases, to prescribe additional functional methods of examination necessary for their confirmation, to formulate a clinical diagnosis of diseases taking into account the obtained data
Ability to: identify and explain the essence of ECG changes detected in patients with the studied heart diseases, prescribe additional functional examination methods necessary to confirm the

diagnosis, formulate a clinical diagnosis of the disease taking into account the obtained data

The discipline "Functional Diagnostics" is a precursor for the disciplines: Hospital Therapy, Current Problems of Cardiology, Polyclinic Therapy, Anesthesiology, Reanimation, Intensive Care.

1.5. Interdisciplinary links with subsequent disciplines

No. in order	Name of subsequent disciplines	Functional diagnostics
1	Hospital Therapy	+
2	Current Problems of Cardiology	+
3	Polyclinic Therapy	+
4	Anesthesiology, Reanimation, Intensive Care	+
5	Faculty Therapy	+

1.6. Requirements to the results of mastering the discipline

The study of the discipline "Functional Diagnostics" is aimed at the formation of the following competencies: universal (UC), general professional (GPC) and professional (PC): UC - 1, 3; GPC - 1, 4, 7, 11; PC - 1, 2, 3, 4, 5, 6, 10, 12, 14.

No. in order	Code and name of competence	Code and name of the competence achievement indicator	As a result of studying the academic discipline "Functional diagnostics" the student must:		
			Know	**Be able to**	**Possess**
Universal competencies					
1	**UC-1.** Able to critically analyze problem situations on the basis of a systematic approach, develop a strategy of action	**AI UC-1.1.** Analyzes a problem situation as a system, identifying its components and the links between them. **AI UC-1.2**. Identifies gaps in information needed to solve problem situations and designs processes to address them. **AI UC-1.3.** The student applies systems analysis to solve problem situations in the professional sphere. domain. **AI UC-1.4.** The student uses logical and methodological tools to critically evaluate modern philosophical and social concepts in his or her subject area. **AI UC-1.5.** Critically assesses the reliability of information sources, works with contradictory information from different sources.	The main historical stages of the development of Functional Diagnostics, the subject and objectives of the discipline, the relationship with other biomedical and medical disciplines; the main terms and concepts used in Functional Diagnostics; modern concepts in the study of cardiac pathology, principles of using logical and methodological tools for critical evaluation of modern concepts of philosophical and social nature of this discipline.	To characterize the stages of formation of Functional Diagnostics as a science and its role at the present stage; to evaluate the levels of organization of the human cardiovascular system; to evaluate the contribution of domestic scientists to the development of Functional Diagnostics, to develop and argue the strategy for solving problem situations on the basis of systemic and interdisciplinary approaches in Functional Diagnostics.	Ability to analyze the significance of Functional Diagnostics at the present stage; system analysis of the obtained data for solving problem situations in the professional sphere; methodology of development and argumentation of the strategy for solving problem situations on the basis of system and interdisciplinary approaches, critical approach to evaluation and reliability of information sources, methods of working with contradictory information from different sources.
2	**UC-3.** Able to	**AI UC-3.1.** Establishes and develops professional contacts in	Basic principles of tolerant perception of social, ethnic,	Tolerantly perceive social, ethnic, confessional and	Ability to develop a team strategy to achieve the set

	organize and lead a team, developing a team strategy to achieve the set goal	accordance with the needs of joint activities, including exchange of information and development of a common strategy; works in a team in a tolerant manner, perceives social, ethnic, confessional and cultural differences.	confessional and cultural differences when working in a team; Ability to communicate effectively and without conflict in the team	cultural differences when working in a team; Communicate effectively and without conflict in a team, including developing a team strategy to achieve the set goal.	goal, including professional goals; methods of effective and conflict-free communication in a team; tolerance to social, ethnic, confessional and cultural differences.
General professional competencies					
3	**GPC -1.** Able to implement moral and legal norms, ethical and deontological principles in professional activities	**AI GPC -1.1**. Carries out professional activities in accordance with ethical norms and moral and ethical principles. **AI GPC -1.2.** Organizes professional activities, guided by the legislation in the field of health care, knowledge of medical ethics and deontology. **AI GPC -1.3.** Has the ability to present an independent point of view, analysis and logical thinking, public speaking, moral and ethical reasoning, discussion and roundtable discussions, principles of medical deontology and medical ethics.	Ethical and deontological aspects of the relationship “doctor-doctor”, “doctor-patient”; principles of effective and conflict-free communication with patients; methods of effective communication between doctor and patient in difficult situations; basic requirements for a doctor's personality; general principles of discussions and round tables	Perform physical examination of the patient and perform functional methods of research, taking into account ethical and deontological principles; communicate effectively and without conflict with patients, relatives and colleagues; form effective relationships with the patient; observe the principles of confidentiality; conduct discussions observing the principles of moral and ethical reasoning.	Possess the ability to communicate with the patient, relatives, colleagues, junior staff; identify problems of patient's application to the doctor; methods of verbal and non-verbal communication with the patient; principles of confidentiality in professional activity and communication with colleagues; continuous improvement of communication abilities in professional activity of the doctor
3	**GPC -4.** Able to use medical devices provided for by the order of medical care,	**AI GPC-4.1.** Uses modern medical technologies, specialized equipment and medical devices, disinfectants, medicines, including immunobiological and other substances and their combinations in solving professional tasks from	Indications and contraindications for the use of modern medical technologies, medical devices, drugs, instrumental, functional and laboratory methods	Apply modern medical technologies, specialized equipment, medical devices, medicines in accordance with the order of medical care, from the position of evidence-based medicine in	Ability to use modern medical technologies, specialized equipment, medical devices, drugs and their combinations, from the position of evidence-based medicine in cardiology;

	as well as to conduct patient examinations to establish a diagnosis	the position of evidence-based medicine. **AI GPC-4.2.** Know the indications and contraindications for prescribing instrumental, functional and laboratory examination methods, possible complications during examination, emergency care and their prevention. **AI GPC -4.3.** Interpret the results of the most common methods of instrumental, laboratory and functional diagnostics, thermometry to identify pathological processes. **AI GPC-4.4.** Performs general clinical examination of patients of various ages. **AI GPC-4.5.** Formulates a preliminary diagnosis and clinical diagnosis according to the ICD.	of examination in cardiology; interpretation of the results of the most common methods of instrumental, laboratory and functional diagnostics; methods of general clinical examination of the patient; principles of formulation of preliminary and clinical diagnosis in cardiology according to the ICD	the field of cardiology; prescribe instrumental, functional and laboratory examination methods; interpret the results of instrumental, laboratory and functional diagnostic methods; conduct a clinical examination of the patient; formulate a preliminary diagnosis and a clinical diagnosis in cardiology according to the ICDB. preliminary diagnosis and clinical diagnosis in cardiology according to the ICD	compare the results of additional examination methods (instrumental, laboratory and functional diagnostics) to identify pathological processes; methods of general clinical examination of patients of different ages; formulation of a preliminary diagnosis and clinical diagnosis according to the ICD, taking into account the totality of clinical and additional methods of examination (instrumental, laboratory and functional)
4	**GPC -7.** Able to prescribe treatment and monitor its efficacy and safety	**AI GPC-7.1.** Selects a drug based on its pharmacokinetic and pharmacodynamic characteristics for the treatment of patients with various nosologic forms in outpatient and inpatient settings. **AI GPC-7.2.** Selects the optimal minimum of the most effective agents using convenient routes of administration. **AI GPC-7.3**. Explains the main and side effects of medications, effects of their combined use, and	Principles of drug selection according to the totality of its pharmacokinetic and pharmacodynamic characteristics for the treatment of patients with various circulatory diseases; advantages of the selected drug and the preferred method of its use; main and side effects of drugs;	To choose the optimal drug (taking into account its pharmacokinetic and pharmacodynamic characteristics) and the preferred method of its use; to identify the main and side effects of drugs used in cardiology, taking into account morphofunctional features, physiological conditions and pathological processes of the human	Ability to prescribe the optimal drug, select the preferred method of its use, taking into account morphofunctional features, physiological conditions and pathological processes in diseases of the circulatory organs, possible drug interactions in the combined use of various drugs; ability to timely detect adverse effects of drugs

		interactions with food, taking into account morphofunctional features, physiologic conditions, and pathologic processes in the human body. **AI GPC -7.5.** Consider morphofunctional features, physiological conditions, and pathological processes in the human body when selecting over-the-counter medications and other pharmacy products. **AI GPC -7.6.** Analyze the results of possible drug interactions in the combined use of various medications. **AI GPC -7.7.** Evaluates the effectiveness and safety of drug therapy using a combination of clinical, laboratory, instrumental and other diagnostic methods.	morphofunctional features, physiological conditions and pathological processes in the body of a cardiac patient when selecting a drug; results of possible drug-drug interactions; results of possible drug-drug interactions in the treatment of patients with various diseases of the circulatory organs.	body; choose over-the-counter drugs and other products of the pharmacy assortment taking into account physiological conditions and pathological processes in patients with diseases of the circulatory organs; take into consideration possible drug interactions in the combined use of various drugs in cardiology; evaluate the effectiveness and safety of drug therapy according to the totality of clinical, laboratory, instrumental and other diagnostic methods in cardiology.	used in clinical cardiology; determination of the effectiveness and safety of drug therapy of circulatory diseases by a set of clinical, laboratory, instrumental and other diagnostic methods.
6	**GPC-11.** Able to prepare and apply scientific, research and production, design, organizational, managerial and regulatory documentation in the health	**AI GPC 11.1.** Apply modern methods of collecting and processing information, conduct statistical analysis of the obtained data in the professional field and interpret the results to solve professional problems. **AI GPC 11.2.** Identifies and analyzes problem situations, searches for and selects scientific, regulatory, legal, organizational and administrative documentation in accordance with specified	Basic methodological approaches to work with educational, scientific, reference, medical literature, including the Internet (methods of collecting and processing information); algorithms and software tools to support decision-making in the course of treatment and diagnostic process in clinical	To work independently with educational, scientific, reference, medical literature, including the Internet (search and select information) in the field of clinical cardiology; perform statistical processing, analyze the obtained data and interpret the results to solve professional problems in the field of diagnostics and	Ability to analyze educational, scientific, reference, medical information, including Internet sources (information collection and processing techniques); basic ability to use medical information systems and Internet resources; methodology of medical documentation; basic scientific methods of

	care system	objectives. **AI GPC 11.3.** Interpret and apply physical, chemical, mathematical, and other natural science concepts and methods to solve professional problems. **AI GPC -11.4.** Conducts scientific and practical research, analyzes information using the historical method, and designs publications based on research results. **AI GPC -11.5.** Analyze and compile accounting and reporting medical documentation and calculate qualitative and quantitative indicators used in professional activities.	cardiology; methods of collection, storage, search, processing, transformation and distribution of information in medical information systems; ways of keeping medical records; basic statistical methods of solving intellectual problems and their application in clinical cardiology.	treatment of circulatory diseases; interpret and apply data of physical, chemical, mathematical and other natural science concepts and methods to solve professional problems in the field of clinical cardiology.	cognition: observation, description, measurement, experiment in the field of clinical cardiology; analysis and compilation of accounting and reporting medical documentation and methods of calculation of qualitative and quantitative indicators used in clinical cardiology.
Professional competencies					
7	**PC-1.** Able to provide emergency and urgent medical care	**AI PC-1.3** Identifies conditions that require emergency medical care **AI PC-1.4** Provides emergency medical care to patients with life-threatening conditions.	Clinical signs of conditions requiring emergency medical care in cardiology (ACS, ACS complicated by pulmonary edema or cardiogenic shock, hypertensive crisis, paroxysmal supraventricular tachycardia, paroxysmal ventricular tachycardia, paroxysmal atrial fibrillation/flutter,	Identify clinical signs of conditions requiring emergency medical care in cardiology (acute cardiac arrest, acute cardiac arrest complicated by pulmonary edema or cardiogenic shock, hypertensive crisis, paroxysmal supraventricular tachycardia, paroxysmal ventricular tachycardia, paroxysmal precordial fibrillation/flutter, complete AV blockade); provide	Ability to diagnose and provide emergency medical care in cardiology (ACS, ACS complicated by pulmonary edema or cardiogenic shock, hypertensive crisis, paroxysmal supraventricular tachycardia, paroxysmal ventricular tachycardia, paroxysmal atrial fibrillation/atrial flutter, complete AV blockade).

			complete AV blockade); methodology of emergency medical care in cardiology	emergency medical care in pulmonology	
8	**PC-2**. Able to collect and analyze complaints, life history and medical history of the patient in order to establish a diagnosis	**AI PC-2.1.** Establishes contact with the patient. **AI PC-2.2.** Collects complaints, specifies them, identifying major and minor complaints. **AI PC-2.3.** Collects and analyzes information about the onset of the disease, the presence of risk factors, the dynamics of symptoms and the course of the disease. **AI PC-2.4.** Analyze the timing of first and second visits to medical care, the amount of therapy provided, and its effectiveness. **AI PC-2.5.** Collects and evaluates information on life history, including data on diseases, traumas and surgical interventions, hereditary, occupational, epidemiologic history.	The method of collecting complaints (major, minor) of a patient with cardiologic pathology; the method of collecting medical history (the timing of seeking medical help, the dynamics of symptoms, the volume of therapy and its effectiveness), life history, including risk factors of respiratory diseases, data on past diseases, injuries and surgical interventions, hereditary, occupational, epidemiologic anamnesis.	Establish contact with the patient; collect complaints and medical history of the patient with pathology of the cardiovascular system, analyze the obtained data; determine risk factors of the existing circulatory disease in the patient; evaluate information on life history, paying special attention to comorbidities, hereditary, allergic, occupational, epidemiological anamnesis.	The ability to establish contact, compliant relationship with a patient with circulatory disease; to collect complaints (major, minor), medical history (onset, dynamics of symptoms, seeking medical help, characteristics and volume of therapy, its effectiveness), life history (risk factors, comorbidities, allergic, occupational, epidemiological history) of a patient with cardiovascular disease.
9	**PC-3.** Able to conduct physical examination of the patient, analyze the results of additional methods of examination in	**AI PC-3.1.** Performs complete physical examination of the patient (inspection, palpation, percussion, auscultation) and interprets its results **AI PC-3.2.** Justifies the necessity, scope and order of diagnostic measures (laboratory, instrumental) and referral for patient's consultations to specialists **AI PC-3.3**. Analyze the results of the patient's examination, justify and	Methods of complete physical examination of a patient with cardiovascular disease (inspection, palpation, percussion, auscultation) and interpretation of its results; necessity, scope, order of diagnostic measures and indications for consultation of	Conduct a complete physical examination of a patient with cardiovascular disease (inspection, palpation, percussion, auscultation) and interpret its results; determine the need, scope, order of diagnostic measures and indications for consultation of specialists; analyze and	Ability to conduct a complete physical examination of a patient with cardiovascular disease (inspection, palpation, percussion, auscultation) and interpretation of its results; refer the patient to diagnostic measures (laboratory, instrumental),

	order to establish the diagnosis	plan the scope of additional examinations, if necessary. Interprets and analyzes the results of collecting information about the patient's disease, data obtained during laboratory, instrumental examination and consultations with specialists, if necessary, justifies and plans the scope of additional studies. **AI PC-3.5**. Performs early diagnosis of diseases of internal organs. Establishes a diagnosis taking into account the current international statistical classification of diseases and health-related problems (ICD) Performs differential diagnosis of diseases of internal organs from other diseases.	medical specialists; methods of analysis and comparison of obtained clinical and diagnostic results of examination of a patient with circulatory disease; indications for prescription of additional methods of examination (if necessary); principles of early diagnosis, main symptoms and symptoms of cardiovascular disease; principles of early diagnostics, main symptoms and symptoms of cardiovascular disease; methods of diagnostics of a patient with cardiovascular disease.	compare the obtained clinical and diagnostic results of examination of a patient with circulatory disease; determine indications for the appointment of additional methods of examination; identify syndromes of cardiovascular disease	to consult the patient to specialists; analyze and compare the clinical and diagnostic results of examination of a patient with a disease of the circulatory organs; the ability to analyze the main clinical manifestations of the cardiovascular disease, making a clinical diagnosis in accordance with the current international statistical classification of diseases and health-related problems (ICD) and justify it; differential diagnosis of identified cardiovascular pathology with other diseases.
10	**PC-4.** Capable of determining indications for hospitalization, indications for emergency, including specialized emergency medical care	**AI PC-4.1**. Determines medical indications for emergency medical care, including specialized emergency medical care **AI PC-4.2**. Refer a patient for specialized medical care in inpatient or day hospital settings if medically indicated, in accordance with current medical care procedures, clinical recommendations (treatment protocols) on medical care issues, taking into account the standards of care	Medical indications for emergency, including specialized emergency medical care in cardiology; medical indications for referral of a patient for specialized medical care in inpatient or day hospital settings, principles of medical devices application in accordance with the current procedures of	Determine medical indications for providing emergency, including specialized emergency medical care, to a patient with a cardiovascular disease; determine medical indications for referring a patient for specialized medical care in a hospital or day care setting, principles of using medical devices in accordance with current	Ability to determine medical indications for emergency, including specialized emergency medical care in cardiology; ability to determine medical indications for referral of a patient for specialized medical care in inpatient or day care, principles of use of medical devices in accordance with the current procedures of medical care,

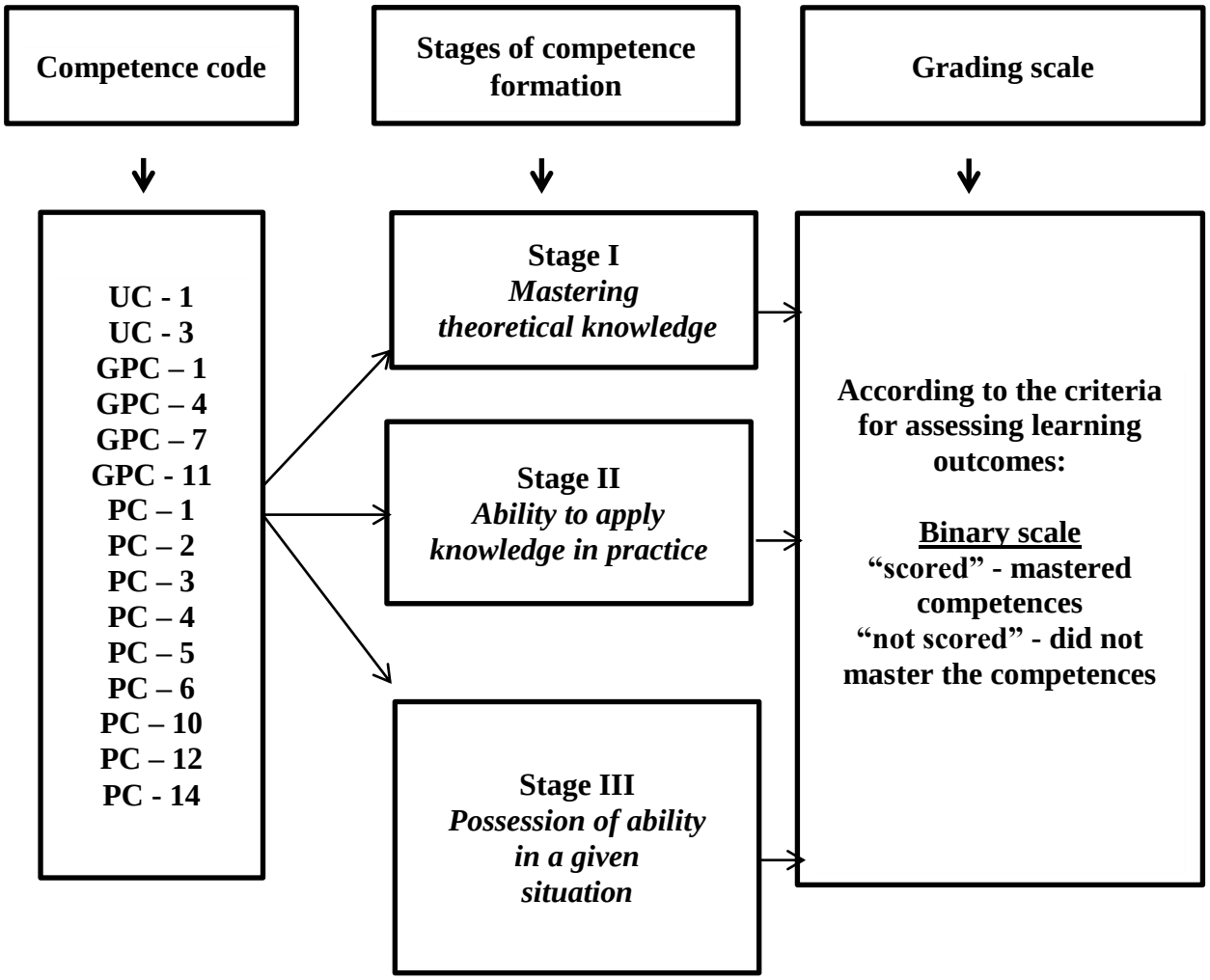
		AI PC-4.3. Apply medical devices in accordance with current medical care procedures, clinical recommendations (treatment protocols) on medical care issues, taking into account the standards of medical care.	medical care, clinical recommendations (treatment protocols) on issues of medical care, taking into account the standards of medical care in cardiology	orders of medical care, clinical recommendations (treatment protocols) in cardiology	clinical recommendations (treatment protocols) on issues of medical care for patients with cardiovascular pathology; ability to determine medical indications for referral of a patient for specialized medical care in inpatient or day care, principles of use of medical devices in accordance with the current procedures of medical care, clinical recommendations (treatment protocols) on issues of medical care for patients with cardiovascular pathology.
11	**PC-5.** Able to prescribe treatment for patients	**AI PC-5.1**. Draws up a treatment plan for a patient, taking into account the patient's diagnosis, age, clinical picture of the disease, presence of complications, concomitant pathology, in accordance with the current procedures for the provision of medical care, clinical recommendations (treatment protocols) for the provision of medical care, taking into account the standards of medical care. **AI PC-5.2.** Prescribe medicines, medical devices and therapeutic nutrition taking into account the diagnosis, age and clinical picture of	Modern methods of application, mechanism of action, indications and contraindications to the prescription of drugs, medical devices in diseases of the circulatory organs (taking into account the diagnosis, age and clinical picture of the disease) in accordance with the current orders of medical care, clinical recommendations (treatment protocols) on	To draw up a treatment plan for a patient with cardiac pathology taking into account the diagnosis, age, clinical picture of the disease in accordance with the current order of medical care, clinical recommendations (treatment protocols) on the provision of medical care, taking into account the standards of medical care in cardiology; to prescribe drugs, medical devices, non-medication treatment for diseases of the	Ability to develop an individual treatment plan for a patient with cardiac pathology taking into account the diagnosis, age, clinical picture of the disease in accordance with the current order of medical care, clinical recommendations (treatment protocols) on the provision of medical care, taking into account the standards of medical care in cardiology; to prescribe non-medication treatment for circulatory

		the disease in accordance with the current procedures of medical care, clinical recommendations, taking into account the standards of medical care **AI PC-5.3**. Prescribe non-medicamentous treatment, taking into account the diagnosis, age and clinical picture of the disease in accordance with current medical care procedures, clinical recommendations, taking into account the standards of medical care **AI PC-5.4**. Provides palliative care in collaboration with specialist physicians and other medical professionals **AI PC-5.5.** Organizes personalized treatment of the patient, including pregnant women, elderly and senior patients	the provision of medical care, taking into account the standards of medical care in cardiology; non-medication treatment taking into account the diagnosis, age and clinical picture of cardiovascular disease; principles of palliative care for patients with circulatory diseases; principles of organizing personalized treatment of the patient, including pregnant women, elderly and elderly patients with cardiovascular diseases	circulatory organs; to provide palliative care to patients with diseases of the circulatory organs; to organize	diseases; to provide palliative care for patients with circulatory diseases; to organize personalized medical care for patients with diseases of the circulatory organs.
12	**PC-6.** Able to control the effectiveness and safety of the therapy conducted	**AI PC-6.1**. Evaluate the effectiveness and safety of the use of medicines, medical devices, therapeutic nutrition and other treatment methods **AI PC-6.2**. Takes into account pharmacodynamics and pharmacokinetics of the main groups of medicines, prevents the development of adverse drug reactions and corrects them if they occur.	Information on the efficacy and safety of drugs, medical devices, therapeutic nutrition and other methods of treatment in cardiology; pharmacodynamics and pharmacokinetics of the main groups of drugs used in cardiology	Evaluate the effectiveness and safety of the use of drugs, medical devices, therapeutic nutrition and other methods of treatment of patients with cardiovascular pathology; take into account the pharmacodynamics and pharmacokinetics of drugs used in cardiology when prescribing them.	Ability to assess the effectiveness and safety of the use of drugs, medical devices, therapeutic nutrition and other methods of treatment of diseases of the circulatory organs; ability to take into account when prescribing the features of pharmacodynamics and pharmacokinetics of drugs used in the treatment of

					pathology of the circulatory organs.
13	**PC -10.** Able to conduct and monitor the effectiveness of preventive work and healthy lifestyle development activities	**AI PC-10.1.** Prescribe preventive measures for patients, taking into account risk factors, to prevent and detect early diseases, including socially significant diseases	Forms and methods of educational work, preventive measures for patients taking into account risk factors for prevention and early detection of circulatory pathology, including socially significant diseases; risk factors for the development of cardiovascular diseases	Identify modifiable risk factors for the development of cardiovascular diseases; timely prescribe preventive measures to patients taking into account risk factors for the prevention and early detection of circulatory diseases, including socially significant diseases in cardiology	Ability to conduct educational work, preventive activities for patients, taking into account the identified risk factors for bronchopulmonary diseases for the prevention and early detection of circulatory pathology, including socially significant ones.
14	**PC-12.** Ready to maintain medical records, including electronic records	**AI PC-12.1.** Fills in medical records, including electronic ones **AI PC-12.2.** Handles patients' personal data and information constituting medical confidentiality. **AI PC-12.3.** Prepares documents when referring patients for hospitalization, consultation, health resort treatment, medical and social expert assessment.	Rules of registration of medical documentation (including in electronic form) in medical organizations of cardiological profile; principles of work with personal data of patients and information constituting medical confidentiality	Fill out medical documentation (including electronic) in cardiological medical organizations; work with patients' personal data and information constituting medical confidentiality; execute documents when referring patients for hospitalization, **consultation**, health resort treatment, medical and social expertise	Ability to fill out medical documentation (including electronic) in cardiological medical organizations; ability to work with patients' personal data and information constituting medical confidentiality; to execute documents when referring patients with cardiological diseases for hospitalization, **consultation**, sanatorium and resort treatment, medical and social expertise
15	**PC-14.** Able to take part in research activities	**AI PC-14.1**. Participates in conducting scientific research **AI PC-14.2.** Analyzes medical information on the basis of evidence-based medicine	Methodology of scientific research; main directions of scientific research in clinical cardiology; principles	Participate in scientific research, analyze medical information on the basis of evidence-based medicine, implement new methods	Ability to participate in scientific research; ability to analyze medical information on the basis of evidence-based medicine and

		AI PC-14.3. Introduces new methods and techniques for adult health care into practical health care.	and methods of scientific research, medical statistics	aimed at protecting the health of the adult population, including the prevention of cardiovascular diseases in practice	introduce new methods aimed at protecting the health of the adult population into practice

1.7. Stages of competence formation and description of their assessment scales



1.8. Forms of training organization and types of knowledge control

Form of student training organization	**Brief characterization**
Lectures	The lecture material contains the key and most problematic issues of the discipline, the most significant in the training of a doctor.
Clinical practicums: - independent work at the patient's bedside; - work in diagnostic rooms; - classes in the certification and simulation center	Designed to analyze (consolidate) theoretical provisions and control over their assimilation with the subsequent application of knowledge gained during the study of the topic, practical abilities and skills.
Interactive forms of learning	- - Interactive survey - - Testing in Moodle system - - Work with a multimedia presentation from the department's collection on the topic of the lesson - - Business game - - Execution of creative tasks

	- - Practical ability of cardiopulmonary resuscitation, treatment of arrhythmias with the help of technical capabilities of the Certification and Simulation Center.
Participation in research work of the department, student circle and conferences	- - working with thematic patients and analyzing case histories; - - preparation of oral reports and poster reports for presentation at the student circle or scientific conference; - - writing theses and abstracts on the chosen scientific direction; - - preparation of a literature review using educational, scientific, reference literature and Internet sources.
Types of control	**Brief characterization**
Input control	Verification of theoretical knowledge and practical abilities formed by the program on Functional Diagnostics to determine the level of preparedness of students in previously passed disciplines. Input control of knowledge includes: - testing in the Moodle system (test of input control of knowledge), The results of the input control are systematized, analyzed and used by the staff of the department to develop measures to improve and update the methods of teaching the discipline.
Current control	Current knowledge control includes: - assessment of mastering of theoretical material (oral questioning and computerized testing); - control of learning practical abilities (interpretation of the results of clinical, laboratory and instrumental methods of examination, formulation of clinical diagnosis (classroom independent work); - control of mastering the method of examination of the patient at clinical practical classes and protocol execution; - checking the solution of situational tasks performed independently (extracurricular independent work); - testing in the Moodle system for all topics of the discipline (tests include theoretical and practical questions); - drawing conclusions on electrocardiograms
Intermediate certification	Intermediate certification is represented by a credit at the end of 10th semester. The test includes the following stages: - assessment of knowledge of theoretical material (interview); - testing in the Moodle system; - testing of practical ability to register and analyze ECG, drug ECG tests, Holter monitoring protocol, bicycle ergometric test.

Explanation. Theoretical knowledge on the discipline students receive lectures, practical classes, taking part in research work of the department, rounds and consultations of patients with supervisors of departments of functional diagnostics, cardiology, pulmonology with a mandatory emphasis on analyzing the results of additional methods of examination. In practical classes is carried out consolidation and control of the learned material. During the training process **interactive forms** of training are used: simulation class, business games, computer simulations, small group method, etc. Practical application of theoretical material in everyday work is logical in the process of learning, helps to acquire practical abilities and skills. In the process of patient supervision, training duty students consolidate and improve the basics of physical examination of patients, the ability to perform and interpret the results of additional methods of examination, clinical diagnosis based on the comparison of all obtained data, making a plan for further examination of the patient, knowledge of medical deontology and medical ethics..

Teaching control: the purpose of this control is to activate students' independent work. Solving test tasks requires the ability to analyze, summarize and is a motivation for more in-depth training in independent work. The educational information of the tests deepens the knowledge of students.

Current control is carried out at each practical training and includes assessment of theoretical knowledge and practical skills developed by students during the training and implies oral and test questioning (similar theoretical and test questions will be offered at the intermediate control), solving situational tasks containing training ECG and spirograms; control of mastering of practical skills (interpretation of ECG and spirograms registered independently, determination of recommendations for further functional examination of the patient, with.

Intermediate certification includes a credit in 10 semester and consists of assessment of theoretical knowledge and practical skills developed by students during the course of the discipline and includes final test control, solving situational tasks containing ECG and spirograms of patients, defense of the educational history of the disease with in-depth analysis of the results of functional examination of the patient..

SECTION 2. STPUCTURE AND CONTENT OF THE DISCIPLINE

2.1 Scope of the discipline and types of academic work

Types of training work	Total hours	10th semester
Lectures	14	14
Clinical practice sessions	34	34
Independent work of students	24	24
Total labor intensity in hours	72	72
Total labor intensity in credit units	2	2

2.2 Thematic plan of lectures and their brief content

No. in order	Topics and content of lectures	Codes of formed competences	Labor intensity in hours
	10 semester		
1.	**Cardiac electrophysiology. Elements of normal ECG and their clinical significance.** The lecture covers vector analysis of ECG to assess changes in amplitude, direction, shape of teeth and displacement of segments. Projection of mean vectors on the axes of leads. Determination of ECG amplitude by projection of mean vectors on lead axes. Normal dynamics of moment vectors P, QRS and T during the cardiac cycle. Change in the direction of moment vectors P, QRS and T depending on the nature of myocardial damage (hypertrophy, blockade, etc.). Sequence of ECG vector analysis. The concept of the electrical axis of the heart (EOS). Methods of determining the position of EOS. Variants of EOS directions (alpha QRS angle values). EOS in norm and pathology. Time analysis of ECG. Elements of normal ECG (teeth, segments, intervals). Determination of heart rate and regularity. Analysis of the duration of intra-cycle ECG intervals (teeth, segments, intervals). Norms of duration of ECG elements. Amplitude analysis of ECG. The concept of isoelectric line. Determination of the amplitude of teeth on ECG. Determination of segment displacement on ECG. Leads of the conventional ECG (12 leads). Standard leads: I, II, III. Amplified unipolar leads from the extremities: aVR, aVL, aVF. Six-axis coordinate system. Thoracic unipolar leads: V1-V6. Additional ECG leads. Additional leftmost (posterior) thoracic leads (V7, V8, V9). Additional right thoracic leads: (V3R-V6R). Additional high thoracic leads (I-II intercostals above the generally accepted level of registration). Additional low thoracic leads (I-II intercostals below the generally accepted level of registration). Neb leads (D, A, I). Clethen leads. Lian leads (S5). Esophageal leads. Significance of additional ECG leads in the diagnosis of myocardial pathology. Normal ECG of adults in leads from the extremities. Characteristics of teeth and segments. Electrical axis P, QRS, T. Normal ECG of adults in thoracic leads. Characteristics of teeth and segments. Transition zone. Variants of normal ECG in heart rotation in the thorax. Normal ECG in additional leads. Characteristics of teeth and segments.	UC 1, 3 GPC 1, 4, 7, 11 PC 1, 2, 3, 4, 5, 6, 10, 12, 14	2 hours
2.	**Diagnosis of automatism and excitability disorders** Clinical and physiological classification of arrhythmias and blockades. Origin of disorders of impulse formation and conduction. ECG in disorders of automatism of the sinus node. Sinus	UC 1, 3 GPC 1, 4, 7, 11 PC 1, 2, 3, 4, 5, 6,	2 hours

	tachycardia. Sinus bradycardia. Sinus arrhythmia. Sinus node arrest. Rigid sinus node. Manifestations or changes in the automaticity of latent pacemakers. Atrial ectopic complexes and rhythms. Right atrial rhythms. Left atrial rhythms. Coronary sinus and coronary node rhythms. Atrioventricular complexes and rhythms. Idioventricular complexes and rhythms. Slow (substitution) slip complexes and rhythms. Accelerated slipping complexes and rhythms. Migration of the supraventricular pacemaker. Atrioventricular dissociation. Incomplete AV dissociation. Complete AV dissociation. Extrasystole. Pathogenesis, clinical significance and classification of extrasystole. Criteria of extrasystole: coupling interval, post-extrasystolic pause, interpolated extrasystoles. Atrial extrasystole. Extrasystole from the AV junction. Ventricular extrasystole. Extrasystoles: monomorphic, monophotic and polymorphic. Extrasystoles: paired, allorhythmia. Extrasystoles: early, extra-early. Atrial fibrillation and flutter. Pathogenesis, clinical significance and prognosis in atrial fibrillation and flutter. ECG signs of atrial fibrillation. ECG-signs of atrial flutter. Paroxysmal and chronic tachycardias. Pathogenesis and classification of paroxysmal and chronic (permanent-recurrent) supraventricular and ventricular tachycardias. Atrial reciprocal paroxysmal and chronic (permanent-return) tachycardia. Atrial focal (focal) paroxysmal and chronic tachycardias. Atrial tachycardia with anterograde AV-blockade of the II degree. Multifocal (chaotic) atrial tachycardia. Atrioventricular (AV) reciprocal paroxysmal and chronic tachycardias. Paroxysmal AV nodal reciprocal tachycardia. Paroxysmal AV-reciprocal (circular) tachycardia in the presence of additional conduction pathways (antidromic and orthodromic with wide and narrow QRS complexes). Focal (focal) paroxysmal and chronic tachycardia from the AV junction. Ventricular tachycardias (VT). Monomorphic paroxysmal VT. Polymorphic (alternating) paroxysmal VT. Bidirectional paroxysmal VT. Paroxysmal ST of the “pirouette” type. Ventricular fibrillation and flutter. Pathogenesis, clinical significance and prognosis in ventricular fibrillation and flutter. ECG signs of ventricular fibrillation. ECG signs of ventricular flutter. ECG in cardiac asystole.	10, 12, 14	
3.	**Diagnosis of conduction disorders** Supraventricular blockades. Clinical and physiologic classification of supraventricular blockades. Sinoatrial blockades of I, II, III degree. Interatrial and intraatrial blockades. Atrial dissociation. Bachmann bundle blockade (interatrial blockade). Intra-atrial blockade. Atrioventricular blockade. AV-blockade of the first degree proximal and distal level. AV-blockade of II degree of proximal and distal level (with and without Wenkebach-Samoylov periodization). AV-blockade of III degree of proximal and distal level. Parasystole. Pathogenesis and clinical significance of parasystole. ECG-criteria of parasystole. Atrial parasystole. Parasystole from the AV junction. Ventricular parasystole.	UC 1, 3 GPC 1, 4, 7, 11 PC 1, 2, 3, 4, 5, 6, 10, 12, 14	2 hours

	Pathogenesis of ECG changes in intraventricular conduction disorders. Clinical significance of intraventricular blockades. The concept of the structure of the Gis system. Classification of intraventricular blockades by localization, severity and permanence. ECG in blockades in the system of the left bundle branch of Gis. Blockade of the anterior branch of the left bundle branch. Blockade of the posterior branch of the left leg of the Gis bundle. Incomplete blockade of the left bundle branch. Complete blockade of the left leg of the Gis bundle. ECG in right bundle branch blockade. Incomplete blockade of the right bundle branch. Complete blockade of the right leg of the bundle of Gis. ECG in combined Gis bundle-branch blockade. Combination of complete blockade of the right leg and anterior branch of the left bundle branch. Combination of complete blockade of the right leg and the posterior branch of the left bundle branch. Transient blockade in the acute period of cardiovascular disease. Transient blockade caused by medications. Electrocardiostimulation (ECS). Indications for ECS. Types of ECS. ECG signs of adequate ECS. ECG signs of inadequate ECS. Some ECG syndromes associated with rhythm and conduction disturbances. Sinus node weakness syndrome. Prolonged QT interval syndrome. Brugada syndrome. Early ventricular repolarization syndrome.		
4.	**Diagnosis of chronic ischemic heart disease and myocardial infarction** ECG during an attack of angina pectoris. ECG in chronic CHD. Tests in CHD - drug and exercise. ECG dynamics during exercise testing. Positive test results - “ischemic” ECG changes. Significance of heart rhythm, conduction and other ECG changes during exercise testing in the diagnosis of CHD. Other functional ECG tests to detect IHD, the role of Holter monitoring in the diagnosis of IHD. Myocardial infarction (MI). Electrophysiology of the lesion focus in acute myocardial infarction (AMI). Structural and functional zones of the lesion focus (ischemia, ischemic damage, necrosis) and their ECG manifestations. Electrophysiology and variants of the monophasic curve. Origin of reciprocal ECG changes. Stages of the course of AMI. Sequence of ECG changes in AMI. Reverse evolution of ECG changes in the course of AMI. ECG in transmural, large-focal, subendocardial and small-focal IM (Q-forming and Q-non-forming). Localization of myocardial infarcts. ECG in right ventricular IM. ECG signs of atrial IM. Complicated IM. Early (limited) and widespread (diffuse) pericarditis. Papillary muscle infarction. Acute left ventricular aneurysm. Pulmonary artery thromboembolism. ECG in recurrent and repeated acute myocardial infarction. ECG in postinfarction cardiosclerosis and chronic left ventricular aneurysms. ECG in the combination of myocardial infarction of various localizations with intraventricular blockades. ECG in combination of myocardial infarction with WPW syndrome. ECG in myocardial infarction against the background of artificial pacemaker..	UC 1, 3 GPC 1, 4, 7, 11 PC 1, 2, 3, 4, 5, 6, 10, 12, 14	2 hours

5.	**Diagnosis of left and right heart hypertrophy** Origin of ECG changes in hypertrophy and overload of heart departments. ECG in atrial hypertrophy. Signs of hypertrophy of the right atrium. Signs of left atrial hypertrophy. Combined atrial hypertrophy. ECG in hypertrophy and ventricular overload. Signs of left ventricular hypertrophy (LVH). Variants of ECG changes associated with the degree of severity of LVH. Signs of LV overload. Asymmetric hypertrophy of the interventricular septum (IVS). Signs of right ventricular hypertrophy (RVH). "R"- and 'S'-types of LV hypertrophy. Variants of ECG changes associated with the degree of severity of RHD. Signs of acute overload of the LV (in LA thromboembolism). Combined ventricular hypertrophy.	UC 1, 3 GPC 1, 4, 7, 11 PC 1, 2, 3, 4, 5, 6, 10, 12, 14	2 hours
6.	**Methods of functional diagnostics of respiratory diseases** Conditions of the study. Conditions of basic exchange. Conditions of relative rest. Criteria for assessing respiratory parameters. Variability of respiratory parameters. Reproducibility and repeatability. Proper values of respiratory indices for adults. Gradations of deviation of respiratory parameters from the norm in adults. Bringing pulmonary volumes to standard conditions (BTPS). Indications and contraindications for the study of respiratory biomechanics. Hygiene requirements. Methods of building a functional conclusion. **Methods of determining the indicators of respiratory biomechanics**. Spirography. Methods of recording Spirogram processing. The main indicators of the spirogram. Evaluation of the results. Electronic spirometry. Flow-volume curve. The main indicators of the curve "flow-volume". Technique of spirometry. Criteria for the correctness of maneuvers. Errors in the performance of maneuvers. General principles of evaluation of spirometry indicators. Evaluation of the study in dynamic observation. Screening methods of research. Picflowmetry. Determination of aerodynamic resistance of the respiratory tract by the method of airflow overlap. Inhalation tests with pharmacological drugs. Bronchodilatation test (test with bronchodilators). Bronchoconstrictor test (provocation test). Conditions for conducting the test. Indications and contraindications. Preparations for conducting the test. Methods of conducting tests in adults. Evaluation of results. Provocative test with cold air. Methods of carrying out. Evaluation of results. Study of the external respiratory system in conditions of physical exertion. Indications and contraindications. Ergospirometry. Detection of physical effort asthma. Evaluation of results. Methods of research of respiratory regulation. New methods of research of the system of external respiration.	UC 1, 3 GPC 1, 4, 7, 11 PC 1, 2, 3, 4, 5, 6, 10, 12, 14	2 hours
7.	**Modern methods of functional examination in the clinic of internal medicine** Stress ECG: the essence and possibilities of the method, ways of conducting tests using treadmill and	UC 1, 3 GPC 1, 4, 7, 11	2 hours

	cycle ergometer, indications and contraindications, rules of conduct, methods of analyzing the results. ECG tests with drugs: variants, indications, contraindications, analysis of results. Holter monitoring: the essence and possibilities of the method, rules of performance, principles of analyzing the obtained data, additional possibilities (ECG monitoring in parallel with BP, ECG monitoring over several days, etc.). Electrophysiological study of the heart: the essence and possibilities of the method, indications and contraindications to its performance, drug tests to detect sinus node weakness syndrome, diagnostic criteria for sinus node weakness syndrome. Testing of ECS, implanted cardioverter-defibrillators: the essence and possibilities of the method.	PC 1, 2, 3, 4, 5, 6, 10, 12, 14	
Total hours			**14**

2.3 Thematic plan of clinical practice sessions and their brief content

No. in order	Name of topics of clinical practical sessions classes	Content of practical classes disciplines	Codes competency	Types of control	Labor intensity in hours
10 semester					
1	**Fundamentals of cardiac electro-physiology.**	Theoretical part: Basic functions of the heart: automatism, conduction, excitability, contractility. Conduction system of the heart: anatomo-functional characterization. Sinus (C-A) node. Intra-atrial and inter-atrial conducting tracts. Centers of latent automatism in the atria. Atrioventricular (AV) junction. Gis-Purkinje system. Myocardial electrophysiology. Membrane theory of the origin of cardiac biopotentials. Excitation of myocardial cells: resting potential and action potential of the contractile fiber membrane. Automatism of myocardial cells, transmembrane potential. Electrical mechanisms of impulse conduction by myocardial cells. Refractoriness of an excited myocardial cell. Dipole and multipole theories of heart electric field formation and electrocardiogram (ECG) genesis. Elementary dipoles - elements of the heart as a generator of biocurrent. The concept of the total (equivalent) dipole. Dynamics of the total	UC-1: AI 1.1., 1.2., 1.3., 1,4.,1,5 UC -3: AI 3.1. GPC-1: AI 1.1.-1.3 GPC -4: AI 4,1-4,5 GPC -7: AI 7.1.,7.2., 7.3.,7.5.,7.6.,7.7. GPC -11: AI 11.1-11.5 PC-1: AI 1.3.,1.4. PC -2: AI 2.1-2.5 PC -3: 3.1-3.6 PC -4: AI 4.1-4.3 PC -5: AI 5.1-5.5 PC -6: AI 6.1., 6.2 PC -10: AI 10.1	Testing Frontal questioning Interactive survey	**3.4 hours**

		dipole during the cardiac cycle. Electric field of the heart in the body (volume conductor) of a healthy person. Definition of ECG as a curve reflecting the dynamics of potential difference at 2 points of the heart electric field during the cardiac cycle. ECG lead axis: location, polarity. Unipolar, bipolar ECG leads. Vector principle in clinical ECG. Vector values. Vector and its characteristics. Addition of vectors.	PC -12: AI 12.1-12.3 PC -14: AI 14.1-14.3		
2	**Normal ECG. Recording and analysis normal ECG.**	Theoretical part: Vector analysis of ECG to assess changes in amplitude, direction, tooth shape and segment displacement. Projection of mean vectors on the axes of leads. Determination of the amplitude of ECG teeth by projection of mean vectors on the lead axes. Normal dynamics of moment vectors P, QRS and T during the cardiac cycle. Change in the direction of moment vectors P, QRS and T depending on the nature of myocardial damage (hypertrophy, blockade, etc.). Sequence of ECG vector analysis. The concept of the electrical axis of the heart (EOS). Methods of determining the position of EOS. Variants of EOS directions (alpha QRS angle values). EOS in norm and pathology. Time analysis of ECG. Elements of normal ECG (teeth, segments, intervals). Determination of heart rate and regularity. Analysis of the duration of intra-cycle ECG intervals (teeth, segments, intervals). Norms of duration of ECG elements. Amplitude analysis of ECG. The concept of isoelectric line. Determination of the amplitude of teeth on the ECG. Determination of segment displacement on ECG. Leads of the conventional ECG (12 leads). Standard leads: I, II, III. Amplified unipolar leads from the extremities: aVR, aVL, aVF. Six-axis coordinate system. Thoracic unipolar leads: V1-V6. Additional ECG leads. Additional leftmost (posterior) thoracic leads (V7, V8, V9). Additional right thoracic leads: (V3R-V6R). Additional high thoracic leads (I-II intercostals above the generally accepted level of registration). Additional low thoracic leads (I-II intercostals below the generally accepted level of registration). Sky leads (D, A, I). Clethen leads. Lian leads (S5). Esophageal leads. Significance of additional ECG leads in the	UC-1: AI 1.1., 1.2., 1.3., 1,4.,1,5 UC -3: AI 3.1. GPC-1: AI 1.1.-1.3 GPC -4: AI 4,1-4,5 GPC -7: AI 7.1.,7.2., 7.3.,7.5.,7.6.,7.7. GPC -11: AI 11.1-11.5 PC-1: AI 1.3.,1.4. PC -2: AI 2.1-2.5 PC -3: 3.1-3.6 PC -4: AI 4.1-4.3 PC -5: AI 5.1-5.5 PC -6: AI 6.1., 6.2 PC -10: AI 10.1 PC -12: AI 12.1-12.3 PC -14: AI 14.1-14.3	Testing Frontal questioning Interactive survey	**3.4 hours.**

		diagnosis of myocardial pathology. Normal ECG of adults in leads from the extremities. Characteristics of teeth and segments. Electrical axis P, QRS, T. Normal ECG of adults in thoracic leads. Characteristics of teeth and segments. Transition zone. Variants of normal ECG in heart rotation in the thorax. Normal ECG in additional leads. Characterization of teeth and segments. Practical part: testing of theoretical knowledge on the results of home training. Familiarization with the device of ECG apparatus and the technique of ECG registration. Safety precautions when working with electrocardiograph. Registration of ECG each student under the guidance of the teacher. Analysis of the received ECG by each student, according to the generally accepted algorithm. Interpretation of the state of individual ECG elements. Analysis of training ECG with different variants of the position of the electrical axis of the heart, positions of the heart. Interpretation of ECG elements.			
3	**Diagnosis dysfunctions of automatism and excitability**	Theoretical part: Clinical and physiological classification of rhythm disorders. Origin of impulse formation and conduction disorders. ECG in disorders of automatism of the sinus node. Sinus tachycardia. Sinus bradycardia. Sinus arrhythmia. Sinus node arrest. Rigid sinus node. Manifestations or changes in the automaticity of latent pacemakers. Atrial ectopic complexes and rhythms. Right atrial rhythms. Left atrial rhythms. Coronary sinus and coronary node rhythms. Atrioventricular complexes and rhythms. Idioventricular complexes and rhythms. Slow (substitution) slip complexes and rhythms. Accelerated slipping complexes and rhythms. Migration of the supraventricular pacemaker. Atrioventricular dissociation. Incomplete AV dissociation. Complete AV dissociation. Extrasystole. Pathogenesis, clinical significance and classification of extrasystole. Extrasystole criteria: coupling interval, post-extrasystolic pause, interpolated extrasystoles. Atrial extrasystole. Extrasystole from the AV junction. Ventricular extrasystole. Extrasystoles: monomorphic,	UC-1: AI 1.1., 1.2., 1.3., 1,4.,1,5 UC -3: AI 3.1. GPC-1: AI 1.1.-1.3 GPC -4: AI 4,1-4,5 GPC -7: AI 7.1.,7.2., 7.3.,7.5.,7.6.,7.7. GPC -11: AI 11.1-11.5 PC-1: AI 1.3.,1.4. PC -2: AI 2.1-2.5 PC -3: 3.1-3.6 PC -4: AI 4.1-4.3 PC -5: AI 5.1-5.5 PC -6: AI 6.1., 6.2 PC -10: AI 10.1 PC -12: AI 12.1-	Testing Frontal questioning Interactive survey	**3.4 hours.**

		monophotic and polymorphic. Extrasystoles: paired, allorhythmia. Extrasystoles: early, extra-early. Atrial fibrillation and flutter. Pathonenesis, clinical significance and prognosis in atrial fibrillation and flutter. ECG signs of atrial fibrillation. ECG signs of atrial flutter. Paroxysmal and chronic tachycardias. Pathogenesis and classification of paroxysmal and chronic (permanent-recurrent) supraventricular and ventricular tachycardias. Sinus reciprocal paroxysmal tachycardia. Atrial reciprocal paroxysmal and chronic (permanent-recurrent) tachycardia. Atrial focal (focal) paroxysmal and chronic tachycardias. Atrial tachycardia with anterograde AV-blockade of the II degree. Multifocal (chaotic) atrial tachycardia. Atrioventricular (AV) reciprocal paroxysmal and chronic tachycardias. Paroxysmal AV nodal reciprocal tachycardia. Paroxysmal AV-reciprocal (circular) tachycardia in the presence of additional conduction pathways (antidromic and orthodromic with wide and narrow QRS complexes). Focal (focal) paroxysmal and chronic tachycardia from the AV junction. Ventricular tachycardias (VT). Monomorphic paroxysmal VT. Polymorphic (alternating) paroxysmal VT. Bidirectional paroxysmal VT. Paroxysmal ST of the "pirouette" type. Ventricular fibrillation and flutter. Pathogenesis, clinical significance and prognosis in ventricular fibrillation and flutter. ECG signs of ventricular fibrillation. ECG signs of ventricular flutter. ECG in cardiac asystole. Practical part: 1) report on duty, 2) analysis of educational thematic ECGs in tapes and using the system of multimedia demonstration of presentations, 3) registration of ECGs of thematic patients by students under the control of the teacher, 4) analysis of registered ECGs, according to the generally accepted algorithm, with the conclusion about the nature of arrhythmia, 5) analysis of thematic patients with a detailed analysis of the available results of additional methods of functional diagnostics, 6) solving situational problems containing ECGs on the topic of the lesson.	12.3 PC -14: AI 14.1-14.3		
4.	**Diagnosis of**	Theoretical part: Supraventricular blockades. Clinical and	UC-1: AI 1.1., 1.2.,	Testing	**3.4 hours.**

	conduction disorders (heart block)	physiologic classification of supraventricular blockades. Sinoatrial blockades of I, II, III degree. Interatrial and intraatrial blockades. Atrial dissociation. Bachmann bundle blockade (interatrial blockade). Intra-atrial blockades. Atrioventricular blockade. AV-blockade of the first degree of proximal and distal level. AV-blockade of II degree of proximal and distal level (with and without Wenkebach-Samoylov periodization). AV-blockade of III degree of proximal and distal level. Parasystole. Pathogenesis and clinical significance of parasystole. ECG-criteria of parasystole. Atrial parasystole. Parasystole from the AV junction. Ventricular parasystole. Pathogenesis of ECG changes in intraventricular conduction disorders. Clinical significance of intraventricular blockades. The concept of the structure of the Gis system. Classification of intraventricular blockades by localization, severity and permanence. ECG in blockades in the system of the left bundle branch of Gis. Blockade of the anterior branch of the left bundle branch. Blockade of the posterior branch of the left leg of the Gis bundle. Incomplete blockade of the left bundle branch. Complete blockade of the left leg of the Gis bundle. ECG in right bundle branch blockade. Non-complete blockade of the right bundle branch. Complete blockade of the right leg of the bundle of Gis. ECG in combined Gis bundle-branch blockade. Combination of complete blockade of the right leg and anterior branch of the left leg of the bundle of Gis. Combination of complete blockade of the right leg and the posterior branch of the left bundle branch. Transient blockade in the acute period of cardiovascular disease. Transient blockade caused by medications. Electrocardiostimulation (ECS). Indications for ECS. Types of ECS. ECG signs of adequate ECS. ECG signs of inadequate ECS. Some ECG syndromes associated with rhythm and conduction disturbances. Sinus node weakness syndrome. Prolonged QT interval syndrome. Brugada syndrome. Early ventricular repolarization syndrome. Practical part: 1) report on duty, 2) analysis of educational thematic ECGs in films and using the system of multimedia demonstration of	1.3., 1,4.,1,5 UC -3: AI 3.1. GPC-1: AI 1.1.-1.3 GPC -4: AI 4,1-4,5 GPC -7: AI 7.1.,7.2., 7.3.,7.5.,7.6.,7.7. GPC -11: AI 11.1-11.5 PC-1: AI 1.3.,1.4. PC -2: AI 2.1-2.5 PC -3: 3.1-3.6 PC -4: AI 4.1-4.3 PC -5: AI 5.1-5.5 PC -6: AI 6.1., 6.2 PC -10: AI 10.1 PC -12: AI 12.1-12.3 PC -14: AI 14.1-14.3	Frontal questioning Interactive survey	

		presentations, 3) registration of ECGs of thematic patients by students under the control of the teacher, 4) analysis of the registered ECGs, according to the generally accepted algorithm, with the conclusion on the nature of conduction disorders, 5) analysis of thematic patients with a detailed analysis of the available results of additional methods of functional diagnostics, 6) solving situational tasks containing ECGs on the topic of the lesson.			
5.	**Practical training in the certification and simulation center**	Theoretical part: Know the ECG signs of tachyarrhythmias and bradyarrhythmias that may require emergency medical care. Know the algorithms of medical care for these rhythm disturbances. Know the anatomo-functional features of the cardiovascular system (the technique of auscultation of the heart and large vessels, determining the pulse and its properties, measuring BP; ECG registration). Practical part: providing emergency care to patients with paroxysmal supraventricular and ventricular tachycardia, tachysystolic form of atrial fibrillation, complete AV-blockade, according to generally accepted algorithms with the use of ACS moulages. Teamwork in different circumstances of the development of respiratory and circulatory arrest on the background of arrhythmia with subsequent assessment of their role in the team. Analysis of ECG with rhythm and conduction disorders. Testing and solving situational tasks on these sections of the course.	UC-1: AI 1.1., 1.2., 1.3., 1,4.,1,5 UC -3: AI 3.1. GPC-1: AI 1.1.-1.3 GPC -4: AI 4,1-4,5 GPC -7: AI 7.1.,7.2., 7.3.,7.5.,7.6.,7.7. GPC -11: AI 11.1-11.5 PC-1: AI 1.3.,1.4. PC -2: AI 2.1-2.5 PC -3: 3.1-3.6 PC -4: AI 4.1-4.3 PC -5: AI 5.1-5.5 PC -6: AI 6.1., 6.2 PC -10: AI 10.1 PC -12: AI 12.1-12.3 PC -14: AI 14.1-14.3	Testing Frontal questioning Inter-active questioning Work with ACS moulages ECG analysis	**2 hours.**
6.	**Diagnosis left and right hypertrophy heart**	Theoretical part: Origin of ECG changes in hypertrophy and overload of heart departments. ECG in atrial hypertrophy. Signs of hypertrophy of the right atrium. Signs of left atrial hypertrophy. Combined atrial hypertrophy. ECG in hypertrophy and ventricular overload. Signs of left ventricular hypertrophy (LVH). Variants of ECG changes associated with the degree of severity of LVH. Signs of LV overload. Asymmetric hypertrophy of the interventricular septum	UC-1: AI 1.1., 1.2., 1.3., 1,4.,1,5 UC -3: AI 3.1. GPC-1: AI 1.1.-1.3 GPC -4: AI 4,1-4,5 GPC -7: AI 7.1.,7.2., 7.3.,7.5.,7.6.,7.7.	Testing Frontal questioning Interactive survey	**3.4 hours.**

		(IVS). Signs of right ventricular hypertrophy (RVH). “R"- and ‘S’-types of LV hypertrophy. Variants of ECG changes associated with the degree of severity of RHD. Signs of acute overload of PG. Combined ventricular hypertrophy. Practical part: 1) report on duty, 2) analysis of educational thematic ECG in films and using the system of multimedia demonstration of presentations, 3) registration of ECG of thematic patients by students under the control of the teacher, 4) analysis of the registered ECG, according to the generally accepted algorithm, with the conclusion about the localization and severity of hypertrophy, 5) analysis of thematic patients with a detailed analysis of the available results of additional methods of functional diagnostics and making a conclusion about the nature of the disease, 6) the decision	GPC -11: AI 11.1-11.5 PC-1: AI 1.3.,1.4. PC -2: AI 2.1-2.5 PC -3: 3.1-3.6 PC -4: AI 4.1-4.3 PC -5: AI 5.1-5.5 PC -6: AI 6.1., 6.2 PC -10: AI 10.1 PC -12: AI 12.1-12.3 PC -14: AI 14.1-14.3		
7.	**Diagnosis chronic ischemic Heart disease by means of ECG and modern methods methods functional diagnostics**	Theoretical part: Angina pectoris and chronic CHD. ECG during an attack of angina pectoris. ECG in chronic IBS. Tests in IHD - drug and exercise testing. ECG dynamics during exercise testing. Positive test results - “ischemic” ECG changes. Significance of heart rhythm, conduction and other ECG changes during exercise testing in the diagnosis of CHD. Other functional ECG tests to detect IHD, the role of Holter monitoring, bicycle ergometry and treadmill test in the diagnosis of IHD. Practical part: 1) report on duty, 2) analysis of educational thematic ECGs in films and using the system of multimedia demonstration of presentations, 3) registration of ECGs of thematic patients by students under the control of the teacher, 4) analysis of registered ECGs, according to the generally accepted algorithm, with the conclusion about the presence and localization of ischemia, 5) analysis of thematic patients with a detailed analysis of the available results of additional methods of functional diagnostics and making a conclusion about the nature of the disease, 6) solving the situation in the case of IHD, 5) analysis of the ECGs of thematic patients with a detailed analysis of the available results of additional methods of functional diagnostics and making a conclusion about the nature of	UC-1: AI 1.1., 1.2., 1.3., 1,4.,1,5 UC -3: AI 3.1. GPC-1: AI 1.1.-1.3 GPC -4: AI 4,1-4,5 GPC -7: AI 7.1.,7.2., 7.3.,7.5.,7.6.,7.7. GPC -11: AI 11.1-11.5 PC-1: AI 1.3.,1.4. PC -2: AI 2.1-2.5 PC -3: 3.1-3.6 PC -4: AI 4.1-4.3 PC -5: AI 5.1-5.5 PC -6: AI 6.1., 6.2 PC -10: AI 10.1 PC -12: AI 12.1-12.3 PC -14: AI 14.1-14.3	Testing Frontal questioning Interactive survey	**3.4 hours.**

		the disease, 6) solving the case of IHD.			
8.	**Diagnosis myocardial infarction depending on its localization and presumed stage.**	Theoretical part: Myocardial infarction (MI). Electrophysiology of the lesion focus in acute myocardial infarction (AMI). Structural and functional zones of the lesion focus (ischemia, ischemic damage, necrosis) and their ECG manifestations. Electrophysiology and variants of monophasic curve. Origin of reciprocal ECG changes. Stages of the course of AMI. Sequence of ECG changes in AMI. Reverse evolution of ECG changes in the course of AMI. ECG in transmural, large-focal, subendocardial and small-focal IM (Q-forming and Q-non-forming). Localization of myocardial infarcts. ECG in right ventricular IM. ECG signs of atrial IM. Complicated IM. Early (limited) and widespread (diffuse) pericarditis. Papillary muscle infarction. Acute left ventricular aneurysm. Thromboembolism of the pulmonary artery. ECG in recurrent and repeated acute myocardial infarction. ECG in postinfarction cardiosclerosis and chronic left ventricular aneurysms. ECG in the combination of myocardial infarction of various localizations with intraventricular blockades. ECG in combination of myocardial infarction with WPW syndrome. ECG in myocardial infarction against the background of artificial heart rhythm driver. Practical part: 1) report on duty, 2) analysis of educational thematic ECGs in films and using the system of multimedia demonstration of presentations, 3) registration of ECGs of thematic patients by students under the control of the teacher, 4) analysis of registered ECGs, according to the generally accepted algorithm, with the conclusion about the presence and localization of myocardial infarction, its stage, 5) analysis of thematic patients with the analysis of the available results of additional methods of functional diagnostics and the diagnosis of the disease and its stage, 6) solution of the problem of myocardial infarction and its stage.	UC-1: AI 1.1., 1.2., 1.3., 1,4.,1,5 UC -3: AI 3.1. GPC-1: AI 1.1.-1.3 GPC -4: AI 4,1-4,5 GPC -7: AI 7.1.,7.2., 7.3.,7.5.,7.6.,7.7. GPC -11: AI 11.1-11.5 PC-1: AI 1.3.,1.4. PC -2: AI 2.1-2.5 PC -3: 3.1-3.6 PC -4: AI 4.1-4.3 PC -5: AI 5.1-5.5 PC -6: AI 6.1., 6.2 PC -10: AI 10.1 PC -12: AI 12.1-12.3 PC -14: AI 14.1-14.3	Testing Frontal questioning Interactive survey	**3.4 hours.**
9.	**ECG diagnosis individual**	Theoretical part: ECG in acute pulmonary heart, cardiomyopathies (hypertrophic and dilated), myocardiodystrophies (dyshormonal, alcoholic, anemic), in	UC-1: AI 1.1., 1.2., 1.3., 1,4.,1,5 UC -3: AI 3.1.	Testing Frontal	**3.4 hours.**

	clinical conditions. Modern methods functional diagnostics	myocarditis, pericarditis, endocrine diseases (thyrotoxicosis, hypothyroidism, obesity), electrolyte imbalance (hypo-, hyperkalemia, hypo-, hypercalcemia), in the effect of drugs on the myocardium. ECG tests with physical load, drug tests. Stress-ECG (bicycle ergometry, treadmill). Diagnostic possibilities of stress-ECG. Indications and contraindications for the study. Technique of stress-ECG. Criteria for evaluation of CHD according to stress-ECG data. Methods of long-term ECG registration. Bedside monitoring in intensive care units. Long-term (outpatient) ECG monitoring by Holter method (HM). Indications for conducting ECG monitoring. Methods of the study. ECG leads in HM. Diagnosis of heart rhythm disorders. Diagnosis of ECG changes of ischemic type. Criteria for the effectiveness of antiarrhythmic and antianginal therapy according to CM. Bifunctional monitoring: daily ECG monitoring (FM) and daily BP monitoring (DMAD). Indications for the study. Methods of the study. Evaluation of the study results. Methods of electrophysiologic study. Electrogram of the Gis bundle. Transesophageal electrical stimulation of atria. The significance of electrophysiological study methods in the diagnosis of rhythm and conduction disorders of the heart. Practical part: 1) report on duty, 2) analysis of educational thematic ECGs in films and using the system of multimedia demonstration of presentations, 3) registration of ECGs of thematic patients by students under the control of the teacher, 4) analysis of registered ECGs, according to the generally accepted algorithm, with the conclusion about the presence and localization of myocardial infarction, its stage, 5) analysis of thematic patients with a detailed analysis of the available results of additional methods of functional diagnostics and the diagnosis of the disease and its stage	GPC-1: AI 1.1.-1.3 GPC -4: AI 4,1-4,5 GPC -7: AI 7.1.,7.2., 7.3.,7.5.,7.6.,7.7. GPC -11: AI 11.1-11.5 PC-1: AI 1.3.,1.4. PC -2: AI 2.1-2.5 PC -3: 3.1-3.6 PC -4: AI 4.1-4.3 PC -5: AI 5.1-5.5 PC -6: AI 6.1., 6.2 PC -10: AI 10.1 PC -12: AI 12.1-12.3 PC -14: AI 14.1-14.3	questioning Interactive survey	
10.	**Functional diagnosis**	Theoretical part: Research methodology and criteria for assessing respiratory parameters. Conditions of the study. Conditions of basic exchange. Conditions of relative rest. Criteria for assessing	UC-1: AI 1.1., 1.2., 1.3., 1,4.,1,5 UC -3: AI 3.1.	Testing Frontal	**3.4 hours.**

	diseases of the respiratory system. **Final lesson.**	respiratory parameters. Variability of respiratory indices. Reproducibility and repeatability. Proper values of respiratory indices for adults. Gradations of deviation of respiratory parameters from the norm in adults. Bringing pulmonary volumes to standard conditions (BTPS). Indications and contraindications for the study of respiratory biomechanics. Hygiene requirements. Methods of building a functional conclusion. Methods of determining the indicators of respiratory biomechanics. Spirography. Methods of recording Spirogram processing. The main indicators of the spirogram. Evaluation of the results. Electronic spirometry. Flow-volume curve. The main indicators of the curve "flow-volume". Technique of spirometry. Criteria for the correctness of maneuvers. Errors in the performance of maneuvers. General principles of evaluation of spirometry indicators. Evaluation of the study in dynamic observation. Screening methods of research. Picflowmetry. Determination of aerodynamic resistance by the method of airflow overlap. Inhalation tests with pharmacological drugs. Bronchodilatation test (test with bronchodilators). Bronchoconstrictor test (provocation test). Conditions for conducting the test. Indications and contraindications. Preparations for conducting the test. Methods of conducting tests in adults. Evaluation of results. Provocative test with cold air. Methods of conducting. Evaluation of results. Study of the external respiratory system in conditions of physical exertion. Indications and contraindications. Ergospirometry. Detection of physical effort asthma. Evaluation of results. Methods of research of respiratory regulation. New methods of research of the system of external respiration. Practical part: 1) report on duty, 2) analysis of educational spirograms in films and using the system of multimedia demonstration of presentations, 3) registration of spiro-grams of thematic patients by students under the control of the teacher, 4) analysis of the registered spirograms, according to the generally accepted algorithm, with the	GPC-1: AI 1.1.-1.3 GPC -4: AI 4,1-4,5 GPC -7: AI 7.1.,7.2., 7.3.,7.5.,7.6.,7.7. GPC -11: AI 11.1-11.5 PC-1: AI 1.3.,1.4. PC -2: AI 2.1-2.5 PC -3: 3.1-3.6 PC -4: AI 4.1-4.3 PC -5: AI 5.1-5.5 PC -6: AI 6.1., 6.2 PC -10: AI 10.1 PC -12: AI 12.1-12.3 PC -14: AI 14.1-14.3	questioning Interactive survey	

		conclusion on the nature of respiratory disorders, 5) performance of pycfloumetry pulmonological patient, 6) case study of patients with a detailed analysis of the results of spirography, pycfloumetry in comparison with physical examination, 6) analysis of the results of spirography, pycfloumetry and physical examination. Final lesson: testing, answering questions for credit, solving situational tasks containing ECG and spirograms on the studied topics.			
Total hours - 72					

2.4 Interactive forms of learning

Interactive teaching methods (discussions, interactive questioning, computer simulations, classes in a simulation class, etc.) are widely used at practical classes in order to activate students' cognitive activity.

No. in order	Topic of the clinical practical session	Labor intensity hours	Interactive form of training	Labor intensity in hours, in % of class
10th semester				
1	Fundamentals of cardiac electrophysiology.	3,4	Interactive survey Testing in Moodle system	30 min. (0.5 hours) / 14.7%
2	Normal ECG. Recording and analysis of normal ECG.	3,4	Interactive survey Testing in Moodle system Work with multimedia presentation from the department's collection	30 min. (0.5 hours) / 14.7%
3	Diagnosis dysfunctions of automatism and excitability	3,4	Interactive survey Testing in Moodle system Work with multimedia presentation from the department's fund Execution of creative assignments	30 min. (0.5 hours) / 14.7%
4	Diagnosis of conduction disorders (heart block)	3,4	Interactive survey Testing in Moodle system Business game “Provision of medical care to a patient with Morgagni-Adams-Stokes attack with AV-blockade of III degree”.	30 min. (0.5 hours) / 14.7%
5	Practical training in the Certification and Simulation Center	3,4	Interactive survey Testing in Moodle system Practicing practical skills of cardiopulmonary resuscitation, treatment of arrhythmias with the involvement of technical capabilities of SAC.	30 min. (0.5 hours) / 14.7%
6	Diagnosis left and right hypertrophy heart	3,4	Interactive survey Testing in Moodle system Work with multimedia presentation from the department's collection	30 min. (0.5 hours) / 14.7%
7	Diagnosis chronic ischemic Heart disease by means of ECG and modern methods methods functional diagnostics	3,4	Business game Interactive survey Testing in Moodle system Work with multimedia presentation from the department's fund Execution of creative assignments	30 min. (0.5 hours) / 14.7%
8	Diagnosis myocardial infarction depending on	3,4	Business game Interactive survey Testing in Moodle system	30 min. (0.5 hours) / 14.7%

	its localization and presumed stage.		Work with multimedia presentation from the department's fund	
9	ECG diagnosis individual clinical conditions. Modern methods functional diagnostics	3,4	Interactive survey Testing in Moodle system Work with multimedia presentation from the department's collection	30 min. (0.5 hours) / 14.7%
10	Functional diagnosis diseases of the respiratory system. Final lesson	3,4	Interactive survey Testing in Moodle system Work with multimedia presentation from the department's collection	30 min. (0.5 hours) / 14.7%

2.5 Criteria for assessing students' knowledge

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

- completeness and correctness:
- the right, accurate answer;
- correct but incomplete or inaccurate answer;
- wrong answer;
- no answer

The grading takes into account the classification of errors and their quality:

- gross errors;
- uniform errors;
- minor errors;
- deficiencies

No. in order	Topic of the practical session	Theoreti-cal part	Practical part	Overall Asses-sment	Forms of control
1	Fundamentals of cardiac electrophysiology.	2-5	2-5	2-5	**Theoretical part** Oral questioning (interview) Test tasks, including those in the Moodle system **Practical part** Evaluation of the conclusion on ECG, spirogram, Evaluation of the solution of situational tasks containing ECG, spirograms. Verification practical skills at the patient's bedside or in the Accreditation and Simulation Center.
2	Normal ECG. Recording and analysis of normal ECG.	2-5	2-5	2-5	
3	Diagnosis dysfunctions of automatism and excitability	2-5	2-5	2-5	
4	Diagnosis of conduction disorders (heart block)	2-5		2-5	
5	Practical training in the Certification and Simulation Center	2-5	2-5	2-5	
6	Diagnosis left and right hypertrophy heart	2-5	2-5	2-5	
7	Diagnosis chronic ischemic Heart disease by means of ECG and modern methods methods functional	2-5	2-5	2-5	

	diagnostics				
8	Diagnosis myocardial infarction depending on its localization and presumed stage.	2-5	2-5	2-5	Analyzing the ability to work with regulatory documents Execution of exercises according to the sample
9	ECG diagnosis individual clinical conditions. Modern methods functional diagnostics	2-5	2-5	2-5	
10	Functional diagnosis diseases of the respiratory system. Final lesson	2-5	2-5	2-5	
	Final session on the discipline	2-5	2-5	2-5	Interview Intermediate testing in Moodle system Assessment of the ability to register and analyze ECG Evaluation of the solution of a situational task containing ECG, spirograms
Average score		**2-5**			

Input control

It is conducted at the first lesson, includes testing in the Moodle system.
Mode of access: https://educ-amursma.ru/course/view.php?id=90

Current control

Current control includes initial and output control of knowledge.
Initial control - is carried out by the teacher at the beginning of each lesson in the form of frontal questioning, solving situational tasks.
Output control - includes control over the methodology of practical skills and protocol execution, testing in the Moodle system.
Mode of access: https://educ-amursma.ru/course/view.php?id=90

The final grade during the current control of knowledge is exhibited on the day of the lesson as the arithmetic mean result for all activities provided for in this lesson of the working program of the discipline.

Evaluation scales of current knowledge control

Successful mastering by students of the discipline (topics/sections - *specify the necessary*), practical skills and abilities is characterized by qualitative assessment and is evaluated on a 5-point system: “5” - excellent, “4” - good, “3” - satisfactory, “2” - unsatisfactory. Conversion of marks into a point scale is carried out according to the following scheme:

Success rate	Score on a 5-point scale
90-100%	«5»
80-89%	«4»
70-79%	«3»
Below 70%	«2»

Criteria for evaluating an oral or written response:

5 points - for the depth and completeness of mastering the content of the study material, in which the student is easily oriented, for the ability to connect theoretical issues with practical ones, to express and justify their judgments, to make a detailed clinical diagnosis and justify it, to prescribe and justify treatment, competently and logically present the answer.
4 points - the student has fully mastered the study material, is oriented in it, competently states the answer, but the content and form have inaccuracies.
3 points - the student has mastered the knowledge and understanding of the main provisions of the study material, but presents it incompletely, inconsistently, makes inaccuracies in the definition of understanding, in the application of knowledge, is unable to make a detailed clinical diagnosis, justify it, justify the examination and treatment.
2 points - the student has scattered and haphazard knowledge of the educational material, is unable to distinguish the main and secondary, makes mistakes in the definition of concepts, distorts their meaning, haphazardly and unsurely presents the material, cannot apply his knowledge to solve situational problems, cannot make a detailed clinical diagnosis, justify it, cannot prescribe examination and treatment.

Test Control Evaluation Criteria:

5 points - up to 10% of incorrect answers
4 points - up to 20% of incorrect answers
3 points - up to 30% of incorrect answers
2 points - over 30% of incorrect answers

Criteria for evaluating the solution of situational tasks containing ECG or spirograms:

5 points - the student correctly analyzes ECG/spirogram, formulates a clinical diagnosis taking into account the data of functional diagnostic methods, prescribes the necessary additional examination.
4 points - the student makes inaccuracies in recording and interpretation of ECG, but in the process of work independently eliminates them and formulates a clinical diagnosis.
3 points - the student makes inaccuracies in recording and interpretation of ECG, which corrects only with the help of the teacher, has difficulty in making a diagnosis.
2 points - the student does not know how to register and interpret ECG, spirograms, in connection with which it is not possible to make a clinical diagnosis and prescribe the necessary additional examination of the patient.

Criteria for evaluating the curation and analysis of case patients:

5 points - the student daily supervises the patient, has fully mastered the methods of objective examination, registration and interpretation of ECG, spirograms, results of pycfloumetry.
4 points - the student supervises the patient on a daily basis, but admits inaccuracies during objective examination and performance of additional diagnostic procedures, which complicates the diagnosis of the disease.
3 points - the student does not regularly supervise the patient, admits inaccuracies in objective examination and performance of additional diagnostic manipulations, which seriously hampers the correct diagnosis.
2 points - the student visited the supervised patient less than 5 times, makes gross errors in objective examination and diagnostic manipulations.

Criteria for evaluating the performance of diagnostic manipulations:

5 points - the student without errors performs all stages of ECG registration and spirogram. At the same time, he/she is correctly aware of the patient's preparation for the procedures and observes all safety rules.

4 points - the student admits some inaccuracies in describing the algorithm of preparing the patient for procedures and/or in performing procedures, but corrected after leading questions from the instructor. In addition, these inaccuracies do not affect patient safety or the final results of the study.
3 points - the student makes inaccuracies in preparing the patient and equipment for the study that may affect patient safety and study results, but is corrected after leading questions from the instructor.
2 points - the student is not able to compose an algorithm for preparing the patient and equipment for the study, has significant difficulties in recording ECG and spirogram, cannot be corrected after leading questions from the instructor. In this regard, the study is not performed and, therefore, the necessary results are not obtained.

Criteria for evaluating the conclusion of the electrocardiogram:

5 points - the conclusion is drawn up according to the approved algorithm, correct conclusions are made on the basis of EG analysis, which allows to correctly interpret the nature of pathological changes without leading questions.
4 points - the conclusion is executed with some inaccuracies, but on the basis of ECG analysis correct conclusions regarding the nature of pathologic changes are made without leading questions.
3 points - the conclusion is executed with violation of the algorithm, the correct conclusion about the nature of pathologic changes on ECG is made after leading questions.
2 points - the conclusion is drawn up with violations of the algorithm, conclusions about the nature of pathological signs on ECG are made incorrectly even after several leading questions.

Working off arrears in the discipline

If a student missed a class for a valid reason, he has the right to work it off and get the maximum mark provided by the working program of the discipline for this class. The valid excuse must be documented.

If a student misses a class for an unjustified reason or receives a mark of "2" for all activities in the class, he/she is obliged to work it off. The mark received for all activities is multiplied by 0.8.

If a student is excused from a class on the recommendation of the dean's office (participation in sports, cultural and other events), he/she will receive a mark of "5" for this class, provided that he/she submits a report on the fulfillment of mandatory extracurricular independent work on the topic of the missed class.

Evaluation criteria for interim certification

The student is allowed to pass the intermediate certification in case of testing on all topics of the discipline for a grade not lower than "3", has no absences and negative grades on all topics of the discipline.

Intermediate certification is carried out in 3 stages:
1. test control in the "Moodle" system
(https://educ-amursma.ru/course/view.php?id=90)
2. Passing practical skills - registration and execution of conclusions on electrocardiograms and spirograms
3. Solving a situational problem containing ECG or spirogram
4. Answering questions for the credit class.

The result of interim certification is a grade of "credited" or "not credited".

Criteria for evaluation of interim certification

Intermediate certification (credit for the discipline) consists of intermediate test control, evaluation of practical skills developed by students during the classes (registration and analysis of ECG), solving

situational problems. The student is allowed to pass the interim certification in case of passing the test on all topics of the discipline for a score not lower than “3”, has no absences and negative marks on all topics of the discipline.
The result of interim certification is the assessment of “credited” or “not credited”.

Intermediate certification is conducted in 3 stages:
1. Intermediate test control in the “Moodle” system (https://educ-amursma.ru/course/view.php?id=90)
2. assessment of practical skills (competencies) developed by students during the classes - ECG recording and analysis
3. Solutions of situational tasks

Criteria for final evaluation of intermediate certification
“Credited” is awarded when the average grade for all the above stages of certification is not less than ‘3’.
“Not credited” is awarded if the average grade for all the above stages of certification is less than 3 points:

Evaluation criteria for interim assessment (10 semester)

Stages	**Score on a 5 5-point scale**	**Binary scale**
Intermediate testing in the “Moodle” system	3-5	**credited**
Full implementation of the practical part of the discipline practical part of the discipline	3-5	
Solution of situational tasks	3-5	
Response to questions for the credit session	3-5	
Intermediate testing in the “Moodle” system	2	**not credited**
Fulfillment of the practical part of the discipline not in full volume	2	
Solution of situational tasks	2	
Response to questions for the credit session	2	

Working off debts in the discipline

If a student misses a class for **a valid reason**, he/she has the right to make up the class in order to increase his/her current rating, if points were awarded for the class.
If the absence **is unexcused or the student's answers are unsatisfactory**, the student must work the class but receive a grade lower.
If a student is exempted from the class **by the Academy Order**, he/she is given the maximum grade provided that he/she completes the compulsory work provided by the program on that day.

2.6. Independent work of students: classroom, extracurricular

Students' independent work consists of two components: classroom and extracurricular (compulsory for all students and optional) work.

Independent work of students in the classroom

Auditorium independent work of students is 25% of the time allocated to the training session. Auditorium work includes: the main didactic tasks of independent work of students under the guidance of a teacher: consolidation of knowledge and skills acquired during the study of academic discipline at lectures and practical classes; prevention of forgetting them; expansion and deepening of educational

material; formation of skills and abilities of independent work; development of independent thinking and creative abilities of students.

The classroom work of students includes: checking current knowledge on the topic of practical training in the form of oral or written questioning, test control, solving situational problems, interpretation of ECG results, spirogram, Holter monitoring data and bicycle ergometric test, the results of electrophysiological study of the heart, making a plan for additional examination and treatment of the patient. Familiarization with the available at the department methodological aids, tables, schemes, stands, tablets. Treatment of patients and registration of the educational history of the disease, practicing practical skills and abilities in the simulation class. Individual work on mastering and performing practical skills (analysis of archival ECG and spirograms, ECG analysis in a multimedia presentation on the topic of the class).

Extracurricular independent work of students

As the main forms of extracurricular independent work can be used: the study of basic and additional educational and scientific literature; solving situational problems, test tasks, work in the Internet class; preparation of oral reports (reports); writing a study history of the disease; duty in the clinic; preparation for a report on duty, performance of diagnostic manipulations; observation and self-observation of specific studied clinical phenomena, etc. This type of learning activity should be based on the activity, initiative, consciousness and self-activity of students.

Topic of the practical session	**Preparatio time preparation time student for the class (hour.)**	**Forms of extracurricular independent work**	
		Mandatory and the same for all students	**Student's choice**
Fundamentals of cardiac electro-physiology.	**2 hours**	Theoretical preparation with the help of lecture materials, basic and additional literature, methodological recommendations, abstracting, drawing up an outline, diagrams, algorithm of ECG interpretation. Solving (or composing) problems, tests, workbook design, work in the Internet class.	Report or computer presentation on the topic: “Membrane theory of the origin of cardiac potentials”, ”Vector principle in clinical ECG.
Normal ECG. Recording and analysis normal ECG.	**2 hours**	Theoretical preparation with the help of lecture materials, basic and additional literature, methodological recommendations, abstracting, drawing up an outline, diagrams, algorithm of ECG interpretation. Solving (or composing) problems, tests, workbook design, work in the Internet class.	Report or computer presentation on the topic: “Basic ECG leads - standard, thoracic, amplified from extremities” “Additional ECG leads”, “Electrical axis and basic positions of the heart”.

Diagnosis dysfunctions of automatism and excitability	**2 hours**	Theoretical preparation with the help of lecture materials, basic and additional literature, methodological recommendations, abstracting, drawing up an outline, diagrams, algorithm of ECG interpretation. Solving (or composing) problems, tests, workbook design, work in the Internet class.	Preparing a presentation or making a table, tablet on the topics: "Rhythm disorders in ventricular preexcitation syndromes", "Electrophysiological study of the heart in the diagnosis of rhythm disorders".
Diagnosis of conduction disorders (heart block)	**2 hours**	Theoretical preparation with the help of lecture materials, basic and additional literature, methodological recommendations, abstracting, drawing up an outline, diagrams, algorithm of ECG interpretation. Solving (or composing) problems, tests, workbook design, work in the Internet class.	Making a multimedia presentation or tablet on the topic: "The structure of the conductive system of the heart", "Electrocardiostimulation: indications, contraindications, types", "Brugada syndrome", "Early ventricular repolarization syndrome".
Practical training in the certification and simulation center	**2 hours**	Theoretical preparation with the help of lecture materials, basic and additional literature, methodological recommendations, abstracting, drawing up an outline, diagrams, algorithm of ECG interpretation in arrhythmias that can lead to the development of emergency conditions. Solving (or composing) problems, tests, workbook design.	Preparation of presentations "Diagnosis and management of supraventricular tachycardia in ventricular pre-excitation syndromes", "Ventricular paroxysmal tachycardias", "Tactics in tachycardias with narrow and wide QRS complexes".
Diagnosis left and right hypertrophy heart	**2 hours**	Preparation on theoretical issues (reading the lecture, basic and additional literature, methodological recommendations, abstracting, drawing up an outline, scheme, algorithm, etc.). Solving (or composing) problems, tests, writing prescriptions, algorithms, performing tasks according to the sample, drawing up a medical history, workbook, working in the Internet class.	Prepare a presentation, or abstract on the topic: "The main causes of right heart hypertrophy", "The main causes of hypertrophy of the left side of the heart", "Methods of diagnostics of hypertrophy of the heart"
Diagnosis chronic ischemic Heart disease by means of	**2 hours**	Preparation on theoretical issues (reading a lecture, basic and additional literature, methodological recommendations, abstracting, drawing up an outline, scheme, algorithm, etc.). Solving	Prepare a presentation, or abstract review on the topic: "ECG-tests of detection of chronic coronary insufficiency", "Bicycle ergometry as a

ECG and modern methods methods functional diagnostics		(or composing) problems, tests, writing prescriptions, algorithms, performing tasks according to the sample, drawing up a medical history, workbook, working in the Internet class.	method of detection of coronary insufficiency: the essence of the method, indications, contraindications, algorithm of analyzing the results obtained"
Diagnosis myocardial infarction depending on its localization and presumed stage.	**2 hours**	Preparation on theoretical issues (reading the lecture, basic and additional literature, methodological recommendations, abstracting, drawing up an outline, scheme, algorithm of ECG interpretation, etc.). Solving (or composing) problems, tests, writing prescriptions, algorithms, performing tasks according to the sample, registration of medical history, workbook, work in the Internet class.	Preparation of presentation, table, tablet on the topic: "Stages of myocardial infarction: pathogenesis, dynamics of ECG changes", "ECG changes in myocardial infarction of various localizations", "Peculiarities of diagnostics of posterior myocardial infarction"
ECG diagnosis individual clinical conditions. Modern methods functional diagnostics	**2 hours**	Preparation on theoretical issues (reading the lecture, basic and additional literature, methodological recommendations, abstracting, drawing up an outline, scheme, algorithm, etc.). Solving (or composing) problems, tests, writing prescriptions, algorithms, performing tasks according to the sample, drawing up a medical history, workbook, working in the Internet class.	Preparation of presentation, table on the topic: "Holter monitoring technique: indications, contraindications, the essence of the method", "Electrophysiological study of the heart: the essence of the method, indications and contraindications, algorithm for analyzing the obtained data", "Peculiarities of ECG in overload of right heart departments", "ECG features in electrolyte disorders", "ECG features in electrolyte disorders"
Functional diagnosis diseases of the respiratory system. **Final lesson**	**2 hours**	Preparation on theoretical issues (reading the lecture, basic and additional literature, methodological recommendations, abstracting, drawing up an outline, scheme, algorithm, etc.). Solving (or composing) problems, tests, writing recipes, algorithms, performing tasks according to the sample, drawing up a workbook, working in the Internet class.	Preparation of presentation, table, tablet "Modern methods of studying the functional state of respiratory organs", "Methods of spirometry: rules of conduct, indications, algorithm of analyzing the obtained data"
Labor intensity in hours	**20 hours**	**20 hours**	**4 hours**
Total	**24 hours**		

labor intensity in hours	

2.7 Research (project) work of students

Scientific research work (SRW) of students is a mandatory section of the discipline and is aimed at the integrated formation of UC, RPC and PC students, provides for the study of special literature and other scientific and technical information about the achievements of domestic and foreign science and technology in the relevant field of knowledge, participation in scientific research, etc. The subject of research work can be chosen by students independently in consultation with the teacher or proposed below list (taking into account the scientific direction of the department). Research topics can be chosen by students independently in consultation with the teacher or from the list below (taking into account the scientific direction of the department.

Example topics of students' research work:

1. Peculiarities of ECG of athletes: norm and pathology.
2. ECG-diagnosis of ventricular preexcitation syndrome. Rhythm disturbances in Wolff-Parkinson-White syndrome.
3. Sinus node weakness syndrome: classification, clinical picture, functional diagnosis. 4.
4. Electrocardiostimulation: the essence of the method, options, indications and contraindications, possible complications of the operation. Criteria of normal operation of ECS. Rules of behavior of a patient with ECS.
5. ECG-diagnosis of rare syndromes (Frederick, Brugada, Wood, Galaverden, Gonax-Ashman, Yervel-Lange-Nielsen, Clerc-Levy-Cristesco, Cossio, Launa-Genon-Livine, Leva, Lenegra, Mobitz, Morchio, Oppenheimer-Rothschild, Romano-Ward, “Sandwich” (White), El-Sherif).

A binary evaluation scale is accepted **for the assessment of the research work:** “credit”, “non-credit”:
- the material on the results of the research in the report is presented in detail, special literature is well elaborated, scientific and technical information on the achievements of domestic and foreign science and technology in the relevant field of knowledge is studied - “scored”.
- material on the results of the research in the report is not set out correctly enough, poorly worked out special literature, studied scientific and technical information on the achievements of domestic and foreign science and technology in the relevant field of knowledge - “not scored”.

3. EDUCATIONAL-METHODICAL, MATERIAL-TECHNICAL AND INFORMATIONAL SUPPORT OF THE DISCIPLINE

3.1 Basic literature

1. Martynov, A. I. Internal Medicine : Vol. I. : textbook / ed. by Martynov A. I. Kobalava Zh. D. Moiseev S. V. - Moscow : GEOTAR-Media, 2021. - 784 pg. - ISBN 978-5-9704-5886-0. - Text : electronic (date of reference: 04.05.2021). - Access mode : by subscription.
http://www.studmedlib.ru/book/ISBN9785970458860.html
2. Martynov, A. I. Internal Medicine : Vol. II. : textbook / ed. by Martynov A. I. Kobalava Zh. D. Moiseev S. V. - Moscow : GEOTAR-Media, 2021. - 704 pg. - ISBN 978-5-9704-5887-7. - Text : electronic (date of reference: 04.05.2021).
http://www.studmedlib.ru/book/ISBN9785970458877.html
3. Makolkin, V. I. Internal Medicine : textbook / Makolkin V. I.. , Ovcharenko S. I. Sulimov V. A. - 6th ed. Moscow : GEOTAR-Media, 2017. - 768 pg. - ISBN 978-5-9704-4157-2. - Text : electronic (date of reference: 04.05.2021).
http://www.studmedlib.ru/book/ISBN9785970441572.html

3.2 Additional literature

1. Shchekotova, V. V. Differential diagnosis of internal diseases / ed. by V. V. Shchekotova, A. I. Martynov, A. A. Spassky. V. Shchekotov, A. I. Martynov, A. A. Spassky. - Moscow : GEOTAR-Media, 2018. - 928 pg. - 928 pg. - ISBN 978-5-9704-4778-9. - Text : electronic (date of reference: 04.05.2021). - Access mode : by subscription.
http://www.studmedlib.ru/book/ISBN9785970447789.html
2. Gantseva, H.H. Clinical examination of the patient / Gantseva H.H.. Ishmuratova R. Sh. , Kyyrgalin Sh. R.. Gainullin A. X. - Moscow : GEOTAR-Media, 2021. - 208 pg. - ISBN 978-5-9704-6035-1. - Text : electronic (date of reference: 14.05.2021). - Access mode : by subscription.
http://www.studmedlib.ru/book/ISBN9785970460351.html
3. Shchukin, Yu. V. Functional diagnostics in cardiology / Yu. V. Shchukin - Moscow: GEOTAR-Media, 2017. - 336 pg. - ISBN 978-5-9704-3943-2. - Text : electronic (date of reference: 05.05.2021). - Mode of access : by subscription.
http://www.studmedlib.ru/book/ISBN9785970439432.html
4. Vurtkin, A. L. Emergency medical care at the pre-hospital stage : a textbook / A. L. Vurtkin, L. A. Aleksanyan, M. V. Balabanova et al. ; ed. by A. L. Vurtkin. - Moscow : GEOTAR-Media, 2016. - 544 pg. - ISBN 978-5-9704-3579-3. - Text : electronic . (date of reference: 06.05.2021). - Access mode : by subscription.
http://www.studmedlib.ru/ru/book/ISBN9785970435793.html
5. First aid and medical knowledge : a practical guide to actions in emergency situations / edited by Dejurny L. I.. , Minnullin I. P. - Moscow : GEOTAR-Media, 2019. - 256 pg. - ISBN 978-5-9704-5426-8. - Text : electronic (date of reference: 06.05.2021). - Mode of access : by subscription.
http://www.studmedlib.ru/book/ISBN9785970454268.html

3.3. Educational and methodical support of the discipline, prepared by the staff of the department

1. Urazova GE, Landyshev YS, Naidenov AV, Semikin EN. Sinus node dysfunction // Blagoveshchensk. – 2006. – 46 pg.
2. Urazova G.E., Landyshev Y.S., Dorovskikh I.E., Vakhnenko Y.V., Naidengov A.V. Acquired heart defects: diagnosis and treatment // Amurtipograph. – Blagoveshchensk. – 2013. – 107 pg.
3. Vakhnenko Y.V., Landyshev Y.S., Dorovskikh I.E., Urazova G.E., Pogrebnaya M.V. Diagnostics of congenital heart defects // Amurtipograph. – Blagoveshchensk. – 2013. – 156 pg.

Electronic and digital technologies

Electronic teaching aids for clinical practical classes in the electronic educational environment of AGMA.

3. Vakhnenko Y.V. Electronic textbook “Clinical situations in cardiology (based on the materials of Cardiosurgical Clinic of ASMA). Part 1.”. – Electronic environment of ASMA. – 2020. https://educ-amursma.ru/mod/resource/view.php?id=19743

2. Vakhnenko Y.V. Electronic textbook “Hypertrophies”. – Electronic environment of AGMA. – 2020 https://educ-amursma.ru/mod/resource/view.php?id=19700
3. Vakhnenko Y.V. Electronic textbook “Normal ECG”. – Electronic environment of AGMA. – 2020 https://educ-amursma.ru/mod/resource/view.php?id=19701
4. Vakhnenko Y.V. Electronic textbook “ECG-diagnostics of various clinical conditions”. – Electronic environment of ASMA. – 2020 https://educ-amursma.ru/mod/resource/view.php?id=19742
5. Urazova G, E. Electronic textbook “Rare ECG syndromes”. – Electronic environment of AGMA. – 2020 https://educ-amursma.ru/mod/resource/view.php?id=19744

Science Library

1. Abashin A.A. Electronic atlas of ECG. In 8 parts. Ch.1 // Abashin. – 2010. – pg. 200. – Format: chm / rar + 3%. – Size: 31.61 Mb
2. Aksenova, G.A.; Domnitskaya, T.M. Atlas of electrocardiograms with unified conclusions (in Russian) // Medpraktika-M. – 2008. – ISBN: 978-5-98803-147-5
3. Internal Medicine in 2 volumes: textbook / Edited by N.A. Mukhin, V.S. Moiseev, A.I. Martynov – Moscow: "GEOTAR-Media". – 2010. – 1264 pg. (CD-disk)
4. Internal Medicine. 333 test problems and comments to them: textbook for universities / Edited by Dvoretsky L.I., Mikhailov A.A., Strizhova N.V., Chistova V.S. – 2nd edition. – Moscow: "GEOTAR-Media". – 2008. – 160 pg. (CD-disk)
5. Internal diseases: a guide to practical classes in faculty therapy: a textbook / edited by Professor Podzolkov V.I. – Moscow: "GEOTAR-Media". – 2010. – 640 pg. (CD-disk)
6. Internal Diseases: Textbook. //M.: JSC "Publishing House Medicine". – 2008. – 720 pg. (Educational literature for students of medical universities) (CD-disk)
7. Vorobyev A.S. Electrocardiography. The newest reference book // Sova. – 2003. – pg. 543. – Format: djvu/rar + 3%. – Size: 29.7 MB
8. Grigorov S. S, Votchal FB, Kostyleva O. V. Title: Electrocardiogram with an artificial pacemaker // Medicine. – 1990. – pg. 240. – Format: djvu/rar + 3%. – Size: 5.14 Mb
9. Diagnostics of internal diseases: medical encyclopedia // M.: 2007. (CD-disk)
10. Intensive therapy (national guide) // M.: "GEOTAR-Media". (CD-disk)
11. Kushakovsky M.S., Zhuravleva N.B. Arrhythmias and heart block (atlas of electrocardiograms) // 1981. – C. 340. – Format: djvu. – 37.2 Mb
12. Medical Encyclopedia // M. – 2007. – 10 volumes (2 CD-discs).
13. Medical standards, clinical protocols and orders of medical care. (CD-disk)
14. Murashko V. V., Strutynsky A.V. Electrocardiography // MEDpress-Infom. – 2007. – Format: djvu. – Size: 12.6 Mb
15. General medical practice: textbook on CD-ROM for students of medical universities. (CD-ROM)
16. Orlov V.N. Manual on electrocardiography // MIA. – 1997. – pg. 528. – Format: DJVU. – Size: 10.1 Mb
17. Plans for the management of patients. Therapy // M.: "GEOTAR-Media". – 2011. (CD-disk)
18. Standards of medical care (information system). – Moscow: "GEOTAR-Media". – 2008. (CD-disk)
19. Strutynskiy A.V. Electrocardiogram: analysis and interpretation // MEDpress-Inform. – 2010. – pg. 224/100. – Format: doc / rar + 3%. – Size: 37.09 Mb
20. Hampton J. Fundamentals of ECG (electrocardiography) // Medical Literature. – 2007. – pg. 274. – Format: djvu. – Size: 5.41 Mb
21. Hampton J. Fundamentals of ECG (electrocardiography) // Medical Literature. – 2007. – pg. 224. – Format: djvu / rar + 3%. – Size: 5.41 Mb
22. Hampton J.R. Atlas of ECG (electrocardiograms). 150 clinical situations // Medical Literature. – 2008. – Format: djvu/rar + 3%. – Size: 48.48 Mb
23. Zimmerman F. Clinical electrocardiography // Binom. – 2008. – pg. 424. – Format: djvu / rar + 3%. – Size: 24.16 MB
24. Ebert, G.-H. Simple ECG analysis: interpretations, differential diagnosis // Logosphere. – 2010. – pg. 280. – Format: djvu / rar + 3%. – Size: 16.1 MB
25. Express-analysis of electrocardiogram // MNMC "Thought". – 2010. – Format: djvu / rar + 3%. – Size: 13.27 Mb
26. Electronic medical library: foreign practical guidelines // M.: Praktika. – 2007. (CD-disk)
27. Yartsev S.S. Electrocardiography. Practical guide-reference book for doctors // 2014. – pg. 227. – Format: djvu. – Size: 26.17 MB

Multimedia materials on electronic media (CD, DVD)

1. Normal ECG
2. ECG-diagnosis of disorders of automatism and excitability functions
3. Supraventricular tachycardia and narrow and wide QRS complexes
4. ECG-diagnostics of conduction disorders
5. ECG-diagnosis of hypertrophy of heart departments
6. ECG-diagnosis of chronic ischemic heart disease and myocardial infarction
7. Modern methods of functional diagnostics in cardiology
8. Rare ECG syndromes
9. ECG diagnostics of separate conditions in cardiology 9.
10. Modern methods of functional diagnostics in pulmonology

Lectures (CD):

1. Cardiac electrophysiology. Elements of normal ECG and their clinical significance.
2. Diagnosis of disorders of automatism and excitability function
3. Diagnosis of conduction function disorders
4. Diagnosis of chronic ischemic heart disease and myocardial infarction
5. Diagnosis of left and right heart hypertrophy

Videos, photographic materials used in teaching students (prepared by departmental staff)

Videos (DVD)

1. Propaedeutics of internal diseases.
2. Propaedeutics of Internal Diseases (RSMU). 3.
3. Methods of spirometry.
4. Methods of bronchodilatation test.

Photographic materials:

1. Sets of training ECG for each practical session
2. Sets of spirograms for 10 practical training sessions
3. Photo album “Cardiac rhythm and conduction disorders”
4. Photo album “ECG-diagnosis of myocardial infarction”
5. Photo album “ECG-diagnostics of hypertrophy of the left and right heart sections”

Albums, stands, tables, tablets, tablets, handouts used in training (prepared by the department staff).

Stands:

1. Conduction system of the heart
2. Anticoagulants in the treatment of heart diseases
3. Differential diagnostics in electrocardiography
4. Stages of electrocardiography formation as a method of diagnostics in Russia and abroad
5. ECG diagnosis of ischemic heart disease 5.
6. Biventricular electrocardiostimulation
7. Types of electrocardiostimulation

Tables

1. Electrocardiographic signs of myocardial hypertrophy.
2. Normal electrocardiogram
3. Significant dates in the development of electrocardiography
4. Membrane theory of cell and muscle fiber excitation
5. Possibilities of electrocardiography

6. Plan to analyze and draw a conclusion on electrocardiography
7. Criteria for evaluating exercise electrocardiography
8. Indications for Holter monitoring.
9. Bazett's table
10. Role of electrocardiography in diagnostics of myocardial infarction
11. Electrocardiogram changes in acute myocardial infarction of different localization
12. Differential diagnostics of large-focal and small-focal myocardial infarction.
13. Types of electrocardiogram changes in ischemic heart disease
14. Unstable angina pectoris
15. Classification of cardiac arrhythmias
16. Classification of gradations of ventricular extrasystoles according to Lown
17. Differential diagnosis of extrasystole
18. Rhythm disorders associated with changes in excitation
19. Decrease in ventilatory function of the lungs
20. Classification of respiratory failure by severity
21. Chronic obstructive pulmonary disease.
22. Indications for peakflowmetry in patients with bronchial asthma
23. Spirographic study of lungs
24. Indications for spirography
25. Indicators of spirogram
26. Areas of application of spirometry
27. Plethysmography

Albums
1. "Cardiac rhythm and conduction disorders".
2. "ECG-diagnosis of myocardial infarction".
3. "ECG-diagnosis of hypertrophy of the left and right heart sections".
4. Methods of functional diagnostics in pulmonology
5. Rare ECG syndromes in cardiology

Handouts:
ECG, spirograms, results of Holter monitoring, results of bicycle ergometric test, results of electrophysiological study of the heart, diaries of pycfloumetry, situational tasks, tests, archival case histories, albums on the studied topics, standards of medical care in emergency conditions in cardiology.

3.4. Equipment used for the educational process

No. in order	Name	Quantity
Study room		
1	Blackboard	**1**
2	Teacher's desk	**1**
3	Training table	**6**
4	Chair	**15**
5	Thematic stands	**3**
6	Booklet folder with ECG set	**3**
Accreditation and Simulation Center (classrooms №3)		
7	Table	**1**
8	Bedside table	**1**
9	System of video monitoring and recording of simulation training process	**1**
10	Medical bed	**1**

11	Medical table	**1**
12	treatment table	**1**
13	Adult male patient simulator for teaching ECG skills	**1**
14	Robot simulator for advanced cardiopulmonary resuscitation training	**1**
15	Cardiopulmonary resuscitation manikin	**1**
16	Training manikin with defibrillation capability	**1**
17	Pulse oximeter	**1**
18	Glucometer	**1**
19	Airway patency restoration trainer	**1**
20	Adult resuscitation simulator	**1**
21	The Phantom of the Resuscitation	**1**
Functional diagnostics room Cardiosurgical Clinic of FSBEI HE Amur SMA		
22	Electrocardiograph	**1**
23	Holter monitoring equipment	**2**
24	Stress test equipment (bicycle ergometer, treadmill)	**2**
25	Apparatus for electrophysiological examination of the heart	**1**

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

No. in order	Name resource name	Resource Description	Access	Resource address
Digital library systems				
1.	“Student's Consultant” Electronic library of medical school.	For students and teachers of medical and pharmaceutical universities. Provides access to electronic versions of textbooks, manuals and periodicals.	Library, individual access	http://www.studmedlib.ru/
2.	“Physician's Consultant” Electronic medical library.	Materials placed in the library are developed by leading Russian specialists on the basis of modern scientific knowledge (evidence-based medicine). The information is prepared taking into account the position of scientific and practical medical society (global, 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 engine in MedLine's largest medical bibliographic database. Documents medical and biological articles from specialized literature, and provides links to full-text articles.	Library, free access	https://pubmed.ncbi.nlm.nih.gov/
4.	Oxford Medicine Online.	A collection of Oxford Medical Publications, bringing together over 350 titles into a cross-searchable resource. Publications include The Oxford Handbook of Clinical	Library, free access	http://www.oxfordmedicine.com

		Medicine and The Oxford Textbook of Medicine, the electronic versions of which are continuously updated.		
5.	Human biology knowledge base	Background information on physiology, cell biology, genetics, biochemistry, immunology, pathology. (Resource of the Institute of Molecular Genetics of the Russian Academy of Sciences.)	Library, free access	http://humbio.ru/
6.	Medical Online library	Free reference books, encyclopedias, books, monographs, essays, English-language literature, tests.	Library, free access	http://med-lib.ru/
Information systems				
7.	Russian Medical Association	Professional Internet resource. Purpose: to promote the effective professional activities of the medical staff. Contains the charter, personalities, structure, membership rules, information about the Russian Medical Union.	Library, free access	http://www.rmass.ru/
8.	Web medicine	The site presents a directory of professional medical resources, including links to the most authoritative thematic sites, journals, societies, as well as useful documents and programs. The site is intended for physicians, students, staff of medical universities and scientific institutions.	Library, free access	http://webmed.irkutsk.ru/
Databases				
9.	World health organization	The site contains news, statistics on the countries that make up the world health organization, newsletters, 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, publications and more.	Library, free access	https://edu.gov.ru/
12.	Federal portal “Russian Education”	A single window of access to educational resources. This portal provides access to textbooks in 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.	DB “Russian Medicine”	Created in the CNMB, it covers the entire collection since 1988. The database contains bibliographic descriptions of articles from domestic journals and collections, dissertations and their abstracts, as well as domestic and foreign books, proceedings of institutes, conference proceedings, etc. Thematically, the database covers all fields of medicine and related fields of 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. Electronic versions of more than 2000 Russian scientific and technical journals are available on the eLIBRARY.RU platform, including more than 1000 open access journals.	Library, free access	http://elibrary.ru/defaultx.asp
15.	Portal Electronic Library of Dissertations	At present, 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	Biomedical portal for specialists. A 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.	MS Windows 7 Pro operating system	License number 48381779
2.	Operating system MS Windows 10 Pro, MS Office	CONTRACT No. 142 A of 25.12.2019
3.	MS Office	License number: 43234783, 67810502, 67580703, 64399692, 62795141, 61350919
4.	Kaspersky Endpoint Security for Business Advanced	Contract No. 977 po/20 of 24.12.2020
5.	1C:University PROF	LICENSE CONTRACT No. 2191 dated 15.10.2020
6.	1C: Library PROF	LICENSE CONTRACT No. 2281 of 11.11.2020
II. Freely distributed software		
1.	Google Chrome	Free to distribute Terms of distribution: https://play.google.com/about/play-

		terms/index.html
2.	Yandex browser	Free of charge Software License Agreement Yandex Browser https://yandex.ru/legal/browser_agreement/
3.	Dr.Web CureIt!	Free of charge License Agreement: https://st.drweb.com/static/new-www/files/license_CureIt_ru.pdf
4.	OpenOffice	Freely distributable License: http://www.gnu.org/copyleft/lesser.html
5.	LibreOffice	Freely distributable License: https://ru.libreoffice.org/about-us/license/

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

1. Ministry of Health of the Russian Federation. Standards of primary medical and sanitary care - https://www.rosminzdrav.ru/ministry/61/22/stranitsa-979/stranitsa-983/1- standarty-pervichnoy-mediko-sanitarnoy-pomoschi
2. Ministry of Health of the Russian Federation. Standards of specialized medical care - https://www.rosminzdrav.ru/ministry/61/22/stranitsa-979/stranitsa- 983/2-standarty-spetsializirovannoy-meditsinskoy-pomoschi
3. The Ministry of Health of the Russian Federation. Procedures for the provision of medical care to the population of the Russian Federation - https://www.rosminzdrav.ru/ministry/61/4/stranitsa-857/poryadki-okazaniya-meditsinskoy- pomoschi-naseleniyu-rossiyskoy-federatsii
4. Clinical recommendations of the Ministry of Health of the Russian Federation - https://medi.ru/klinicheskie-rekomendatsii/
5. Website of the Russian Respiratory Society - http://spulmo.ru
6. Website of the Russian Society of Cardiology - http://scardio.ru
7. Federal Electronic Medical Library. Ministry of Health of the Russian Federation - http://www.femb.ru
8. Library of the Amur State Medical Academy. Access mode: https://amursma.ru/obuchenie/biblioteki/biblioteka-amurskoy-gma/
9. EBS "Student's Consultant". Access mode: http://www.studmedlib.ru/cgi-bin/mb4x
10. Electronic library of medical literature. Access mode: https://www.books-up.ru/ru/entrance/97977feab00ecfbf9e15ca660ec129c0/
11. Scientific and Practical Journal "Doctor and Information Technologies". Access mode: http://www.studmedlib.ru/book/1811-0193-2010-01.html

4. Evaluation Fund

4.1. Examples of test tasks for entrance, current control and intermediate certification

Testing is conducted in the Moodle system (e-mail address https://educ-amursma.ru/course/view.php?id=90). Input test control includes 149 tasks, initial (current) - 200 test tasks (20 for each topic), intermediate - 100 test tasks.

Examples of INPUT test tasks with single-valued answer selection

1. THE NORMAL TRANSITIONAL ZONE ON THE ECG IS LOCATED IN THE LEAD

1) V3
2) V4
3) V2
4) V5

2. IN NORM, THE LARGEST AMPLITUDE OF THE TOOTH R IS REGISTERED IN THE LEAD

1) V3
2) V4
3) V5
4) V6

3. IN NORMAL STANDARD LEADS, THE LARGEST AMPLITUDE OF THE R-VALVE IS RECORDED IN THE LEAD

1) II
2) III
3) I
4) the amplitude of the tooth R does not depend on the lead

Answers: 1, 2, 3

Examples of test tasks of the current control with single-valued answer selection

1. EXTRASYSTOLES FROM AV-JUNCTION ARE CHARACTERIZED BY

1) presence of a complete compensatory pause
2) usually widened QRS complex
3) a (+) P tooth in front of the QRS complex
4) a narrow QRS complex and absence of the P tooth

2. ATRIAL FLUTTER IS THE MOST DIFFICULT TO DIFFERENTIATE

1) with ventricular flutter
2) with paroxysmal antidromic tachycardia in WPW syndrome
3) with nodal paroxysmal tachycardia
4) atrial tachycardia with AV-blockade of the II degree

3. A PATIENT HAS A SUDDEN ONSET OF PALPITATIONS (160 BEATS/MIN), WHICH THE DOCTOR STOPPED BY CAROTID MASSAGE. SYNUS. THIS ATTACK WAS MOST LIKELY CAUSED BY

1) sinus tachycardia
2) paroxysm of atrial fibrillation
3) paroxysm of supraventricular tachycardia
4) a paroxysm of ventricular tachycardia

Answers: 4, 4, 3

Examples of test tasks of the PROMOTIONAL control
single-choice (https://educ-amursma.ru/course/view.php?id=90) –
100 test tasks

1. STABLE ANGINA PECTORIS IS MOST CHARACTERIZED BY THE REGISTRATION ON THE ECG DURING AN ATTACK OF

1) deep Q
2) horizontal ST segment depression
3) flattened T plaque
4) deep jagged S teeth

2. HEMODYNAMIC ANGINA PECTORIS MAY BE CAUSED BY

1) coronary artery disease
2) atherosclerosis
3) aortic and subaortic stenosis
4) fibrinous pleurisy

3. RELIABLE ST SEGMENT ELEVATION IN MOST LEADS IS CHARACTERISTIC FOR

1) myocardial infarction
2) pericarditis
3) angina attack
4) hernia of the esophageal opening of the diaphragm

Answers: 2, 3, 2

4.2 Examples of situational tasks of current control (with answer standards)

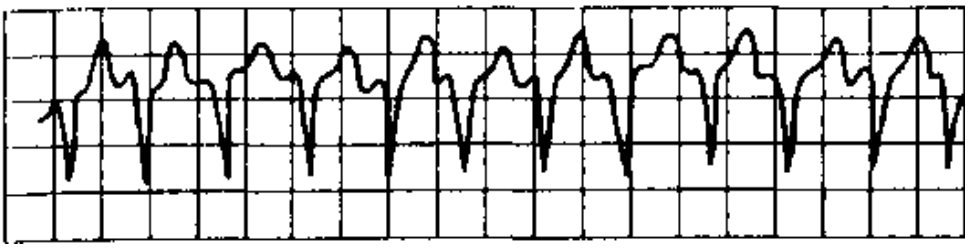
Task 1

Patient Shch., 54 years old, complains of shortness of breath at minor physical activity, frequent interruptions in the heart, attacks of palpitations, during which he feels dizziness, sharp general weakness, swelling on the shins, a feeling of heaviness in the right subcostal area, rapid fatigue. During the last year he lost weight by 7 kg.

He considered himself sick for 1.5 years, when heart palpitations and shortness of breath at moderate physical activity appeared. Very quickly the severity of these symptoms increased, tolerance to physical exertion decreased. Six months ago swellings on the lower legs appeared. 2 months ago attacks of palpitations appeared.

Before the described events he did not suffer from any chronic diseases. He works as a driver of a walking excavator. He has undergone medical examinations twice a year and was found to be in good health. Mother, age 75, has suffered from arterial hypertension for the past 2 years. Father died of gastric cancer, no heart disease. The patient himself notes occasional alcohol abuse.

On examination, the right border of the heart is 2.5 cm outside the right edge of the sternum, the left border is along the anterior axillary line. Heart tones are muffled, arrhythmic due to single frequent (up to 5-6 per minute) extrasystoles. I tone at the apex and at the sternum is weakened. There is a blowing systolic murmur. HR 69 per minute. There is no pulse deficit. BP 110 and 65 mm Hg. Swelling on the shins. The liver protrudes 2 cm from under the rib arch.



Holter monitoring revealed 7 episodes of rhythm disturbance indicated in the figure (duration of 3 of them was more than 30

seconds) (figure below).

Transesophageal echocardiography revealed dilatation of the left and right ventricular cavities and both atria, additional formation (thrombus) in the left atrial auricle, decreased contractile function of the left ventricle (ejection fraction 27%).

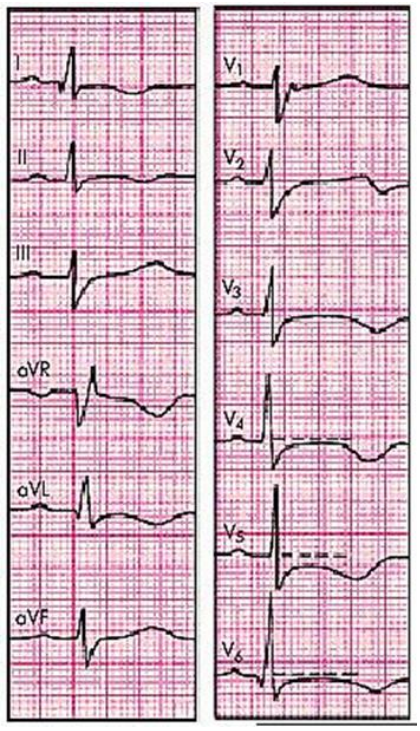
Questions

1. What is the working diagnosis of the underlying disease?
2. What are its complications in the patient?
3. What is the danger of this rhythm disturbance and how can it be prevented in this patient?
4. With what diseases should the described pathology be differentiated?

Answer standard

1. Dilated cardiomyopathy
2. Ventricular extrasystole and ventricular paroxysmal tachycardia, CHS III stage, left atrial appendage thrombosis. The latter may require placement of an occluder at the outlet of the left atrial appendage.
3. This rhythm disturbance may transform into ventricular flutter and fibrillation. Considering that ventricular tachycardia is stable, and according to ECHO CG data the left ventricular ejection fraction is very low, implantation of a cardioverter-defibrillator is indicated for the patient.
4. With CHD, rheumatic heart disease.

Task 7

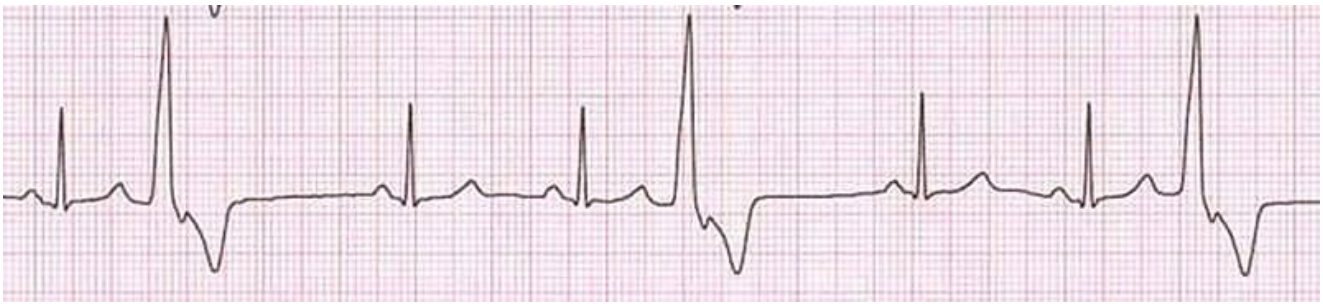


Patient S., 34 years old, complains of constant monotonous pain in the heart area without irradiation, shortness of breath with minor exertion, interruptions in the work of the heart in the form of stopping and turning over, general weakness, sweating, periodic increase in body temperature to 37.3-37.5 degrees C.

Medical history. He considers himself sick for 1 month after a pneumonia, for which he was treated in hospital for 3 weeks. He was discharged with clinical and radiologic improvement. However, shortly after discharge heart pain appeared, dyspnea on physical exertion, general weakness, temperature increased again. X-ray radiographs showed no signs of recurrent pneumonia. Attention was paid to the increase in the cross-section of the heart.

Life history. He grew and developed normally. From adolescence to the present time - frequent follicular sore throats (up to 2-3 times a year).

Physical examination. Body build is normosthenic, nutrition is normal. The skin is moist, warm. Body temperature 37.2 degrees C. Thyroid gland is not enlarged. Consciousness is clear, behavior is adequate. The heart area is visually unchanged. Heart tones arrhythmic, muffled. I tone over the apex is weakened. Systolic



murmur over the apex. HR 82 per minute, BP 110/70 mm Rt st. Pastosity of the shins. Vesicular respiration, conducted in all fields, no rales. Resting respiration rate 18 per minute. Abdomen b/o. The liver is not enlarged. Stool, diuresis are normal.

Additional data. Clinical blood analysis: Er. 4.6 x 1012/l, Hg 129 g/l, L. 10.4 x 109/l, thromb. 185, s/e 65%, lymph. 33%, mon. 2%, LSR 18 mm/hour.
Biochemical blood analysis: glucose 4.3 mmol/L, urea 5.1 mmol/L, total protein 77 g/L, cholesterol 4.3 mmol/L, triglycerides 1.2 mmol/L, CRP ++, AST 52.1, ALT 46.7, fibrinogen 5.1, PTI 82. ECHO CG revealed inhomogeneity of LV myocardial structure, reduction of its ejection fraction. On ECG (see figures) there are the following changes.

Questions:

1. What rhythm disorder is present in the patient?
2. What disease is it caused by? Confirm the diagnosis taking into account clinical syndromes and additional data.
3. Explain the changes in the presented ECG?
4. What additional examinations should be performed in this case?
5. Principles of treatment.

Answer reference:

1. Left ventricular extrasystole
2. Acute infectious myocarditis (pain, intoxication syndromes, signs of left ventricular insufficiency; subfebrile, changes in acute phase blood parameters, ECG changes).
3. Violation of the processes of LV myocardial repolarization due to inflammatory changes in the heart muscle and the presence of low ejection syndrome
4. Treatment of the underlying disease + in the presence of frequent (more than 200 per day) ventricular extrasystoles in Holter monitoring - prescription of antiarrhythmic drugs

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

1.Drawing up an algorithm for preparing a patient for spirography
2.Compiling an algorithm for preparing the patient and equipment to perform ECG
3.Registration of ECG in 12 leads in compliance with the necessary safety rules
4. Analyze the obtained data, according to the accepted alogorithm
5. Diagnose disorders of automatism function
6. Diagnose disorders of excitability function
7. Diagnose conduction dysfunction
8. Diagnose hypertrophy of cardiac compartments
9. Detect signs of chronic coronary insufficiency (ischemia)
10. Perform drug ECG tests that stimulate ischemia manifestations on the ECG
11. To conduct drug ECG tests that stop ischemia manifestations on the ECG
12. Determine indications for Holter monitoring
13. Determine indications and contraindications to stress-ECG-tests (bicycle ergometry)
14. Determine indications and contraindications to electrophysiologic study of the heart
15. Diagnose acute myocardial infarction and determine its localization
16. Diagnose the stages of myocardial infarction
17. Determine ECG signs of TELA
18. Determine ECG signs of cardiac aneurysm
19. Determine ECG signs of electrolyte balance disorders (hypo- and hyperkalemia)
20. Determine ECG signs of pericarditis
21. Determine ECG signs of HCMP
22. Identify ECG signs of cardiac glycoside overdose
23. Diagnose obstructive respiratory dysfunction using spirography
24. Interpret the results of spirography with bronchodilators
25. Interpret the results of pycfloumetry

4.4 List of questions for credit (interim certification)

1. Elements of normal ECG and their characteristics.

2. Safety rules when working with an electrocardiograph.
3. ECG registration algorithm.
4. Algorithm of ECG analysis.
5. ECG-signs of supraventricular extrasystole. 5.
6. ECG signs of ventricular extrasystole.
7. ECG signs of paroxysmal supraventricular tachycardia. 7.
8. ECG signs of ventricular tachycardia.
9. ECG signs of ventricular flutter and fibrillation. 9.
10. Mechanisms of occurrence and ECG signs of atrial fibrillation.
11. Mechanisms of origin and ECG signs of atrial flutter. 11.
12. ECG signs of sinoatrial blockade depending on its degree.
13. ECG signs of atrioventricular blockade depending on its degree.
14. ECG signs of intraventricular conduction disturbances.
15. ECG signs of ventricular preexcitation phenomenon (WPW, CLC).
16. Mechanism of development and ECG-diagnosis of cardiac rhythm disturbances in ventricular preexcitation syndromes.
17. ECG-signs of left heart hypertrophy. 18.
18. ECG-signs of right heart hypertrophy.
19. ECG-signs of chronic ischemic heart disease.
20. Drug ECG tests for the detection of chronic ischemic heart disease.
21. Drug ECG tests for the detection of chronic ischemic heart disease.
22. Stress-ECG tests with physical load for detection of chronic ischemic heart disease. Indications. Contraindications. Methods of performance.
23. Indications and contraindications for electrophysiologic cardiac examination to detect coronary insufficiency. Methods of performance.
24. Indications and contraindications for cardiac electrophysiologic study to detect ventricular pre-excitation syndromes. Methodology.
25. Modern methods of functional diagnostics in cardiology. 26.
26. ECG-signs of the acute stage of myocardial infarction. 27.
27. ECG-signs of the subacute stage of myocardial infarction. 28.
28. ECG-signs of postinfarction cardiosclerosis.
29. ECG-diagnostics of myocardial infarction localization.
30. ECG-signs of TELA
31. ECG-signs of cardiac aneurysm
32. ECG signs of electrolyte balance disorders (hypo- and hyperkalemia)
33. ECG signs of pericarditis
34. ECG signs of HCMP
35. ECG signs of cardiac glycoside overdose
36. Spirographic criteria of obstructive respiratory dysfunction.
37. Spirographic criteria of respiratory dysfunction of restrictive type.
38. Criteria of “positivity” of spirographic tests with bronchodilators.

APPROVED
at the meeting of the Department of Hospital Therapy with a course of Pharmacology
Protocol No. 10 dated June 30, 2022
Head of Department

V.V. Voytsekhovsky

ADDITIONS AND AMENDMENTS TO THE WORKING PROGRAM «FUNCTIONAL DIAGNOSTICS» SPECIALITY General Medicine for 2022 - 2023 academic year

Teaching in the discipline “Functional diagnostics” specialty 31.05.01 Medicine will be conducted according to the approved working program.

The working program is amended in p. 3.6. Licensed and freely distributed software used in the educational process.

List of software (commercial software products)

No. in order	List of software (commercial software products)	Details of supporting documents
1.	MS Windows 7 Pro operating system	License number 48381779
2.	MS Windows 10 Pro operating system	CONTRACT No. UT-368 of 21.09.2021
3.	MS Office	License number: 43234783, 67810502, 67580703, 64399692, 62795141, 61350919
4.	Kaspersky Endpoint Security for Business Advanced	Contract 326po/21-IB of 26.11.2021
5.	1C Accounting and 1C Payroll	LICENSE AGREEMENT 612/L dated 02.02.2022
6.	1C: University PROF	LICENSE AGREEMENT No. CB-1151 dated 01.14.2022
7.	1C: Library PROF	LICENSE AGREEMENT No. 2281 dated 11.11.2020
8.	Consultant Plus	Contract No. 37/C of 25.02.2022
9.	Aktion 360	Contract No. 574 of 16.11.2021
10.	E-learning environment 3KL(Russian Moodle)	Contract No. 1362.2 of 15.11.2021
11.	Astra Linux Common Edition	Contract No. 142 A of 21.09.2021
12.	Information system “Plans”	Contract No. 8245 of 07.06.2021
13.	1C:Document Management	Contract No. 2191 dated 15.10.2020
14.	P7-Office	Contract No. 2 CC of 18.12.2020

List of freely distributed software

No. in order	List of freely distributed software	Links to the license agreement
1.	Yandex browser	Yandex Browser Software License Agreement distributed free of charge https://yandex.ru/legal/browser_agreement/
2.	Yandex.Telemost	Free of charge Software License Agreement https://yandex.ru/legal/telemost_mobile_agreement/
3.	Dr.Web CureIt!	Free of charge License Agreement: https://st.drweb.com/static/new-www/files/license_CureIt_ru.pdf
4.	OpenOffice	Freeware License: http://www.gnu.org/copyleft/lesser.html
5.	LibreOffice	Freeware License: https://ru.libreoffice.org/about-us/license/

Verification of the level of knowledge obtained during the study of the discipline will be carried out in the form of testing on the platform of EIOS (Moodle).

To make changes in section 3.3.1 (electronic and digital technologies), adding information about the following documents prepared in 2021-2022 and approved by the CCMS:

Vakhnenko Y.V. Electronic textbook “ECG-diagnostics of heart diseases” - Electronic environment of ASMA. – https://educ-amursma.ru/course/view.php?id=199

Vakhnenko Y.V. Electronic tutorial “Myocardial infarction with ST elevation and its complications” Electronic tutorial “ECG-diagnostics of heart diseases” - Electronic environment of AGMA. – https://educ-amursma.ru/course/view.php?id=199

APPROVED
at the meeting of the Department of Hospital Therapy with a course of Pharmacology
Protocol No. 8 dated May 24, 2023
Head of Department, Holder of an Advanced Doctorate in Medical Sciences

Professor V.V. Voytsekhovsky

ADDITIONS AND AMENDMENTS TO THE WORKING PROGRAM «FUNCTIONAL DIAGNOSTICS» SPECIALITY General Medicine for 2023 - 2024 academic year

List of software (commercial software products)

No. in order	**List of software (commercial software products)**	**Details of supporting documents**
1	MS Windows 7 Pro operating system	License number 48381779
2	MS Windows 10 Pro operating system	CONTRACT No. UT-368 of 21.09.2021
3	MS Office	License number: 43234783, 67810502, 67580703, 64399692, 62795141, 61350919
4	Kaspersky Endpoint Security for Business - Standard Russian Edition. 50-99 Node 2 year Educational Renewal License	Contract 165A dated 25.11.2022
5	1C Accounting and 1C Salary	LICENSE CONTRACT 612/L of 02.02.2022
6	1C: University PROF	LICENSE CONTRACT No. TSB-1151 dated 01.14.2022
7	1C: Library PROF	LICENSE CONTRACT No. 2281 dated 11.11.2020
8	Consultant Plus	Contract No. 37/C of 25.02.2022
9	Contour.Talk	Contract No. K007556/22 of 19.09.2022
10	E-learning environment 3KL(Russian Moodle)	Contract No. 1362.3 of 21.11.2022
11	Astra Linux Common Edition	Contract No. 142 A of 21.09.2021
12	Information system “Plans”	Contract No. 9463 of 25.05.2022
13	1C: Document Management	Contract No. 2191 dated 15.10.2020
14	P7-Office	Contract No. 2 CC of 18.12.2020

List of freely distributed software

No. in order	List of freely distributed software	Links to the license agreement
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2	Yandex.Telemost	Freely distributable
3	Dr.Web CureIt!	Free to distribute

		License Agreement: https://st.drweb.com/static/new-www/files/license_CureIt_ru.pdf
4	OpenOffice	Freely distributable License: http://www.gnu.org/copyleft/lesser.html
5	LibreOffice	Freely distributable License: https://ru.libreoffice.org/about-us/license/
6	VK Calls	Freely distributable https://vk.com/licence

APPROVED
at the meeting of the Department of Hospital
Therapy with a course of Pharmacology
Protocol No. 9 dated May 6, 2024

Head of Department, V.V. Voytsekhovsky

Holder of an Advanced Doctorate in Medical Sciences

ADDITIONS AND AMENDMENTS TO THE WORKING PROGRAM

«FUNCTIONAL DIAGNOSTICS» SPECIALITY General Medicine

for 2024 - 2025 academic year

1. Amend and update the table in the section “Professional databases, information and reference systems, electronic educational resources”.

Name of resource	Resource Description	Access	Resource address
Digital library systems			
“Student Advisor. Electronic Library of Medical University”	For students and teachers of medical and pharmaceutical universities. Provides access to electronic versions of textbooks, manuals and periodicals.	Access is remote, after registration under the university profile	http: //www .studmedlib.ru/
“Physician's Consultant” Electronic medical library.	The materials placed in the library are developed by leading Russian specialists on the basis of modern scientific knowledge (evidence-based medicine). The information is prepared taking into account the position of scientific and practical medical society (global, European and Russian) in the relevant specialty. All materials have undergone mandatory independent review.	Access is remote, after registration under the university profile	http://www.rosmedlib.ru/cgi-bin/mb4x
EBS “Bookup”	The Big Medical Library is an information and educational platform for sharing electronic educational, training and methodological publications of medical universities in Russia and CIS countries.	Access is remote, after registration under the university profile	https://www.books-up.ru/
EBS «Lan»	Network electronic library of medical universities - electronic database of educational and scientific works of medical topics, created for the purpose of implementation of network forms of professional educational programs, open access to educational materials for partner universities.	Access is remote, after registration under the university profile	https://e.lanbook.com/
CyberLeninka scientific electronic library	CyberLeninka is a scientific electronic library built on the Open Science paradigm, the main objectives of which are popularization of science and scientific activity, public quality control of scientific publications, development of interdisciplinary research, modern institute of scientific review, increasing the citation rate of Russian science and building a knowledge infrastructure. It contains more than 2.3 million scientific articles.	free access	https://cyberleninka.ru/
Oxford Medicine Online	A collection of Oxford Medical Publications, bringing together over 350 titles into a cross-searchable resource. Publications include The Oxford Handbook of Clinical Medicine and The Oxford Textbook of Medicine, the electronic versions of which are continuously updated.	free access	http://www.oxfordmedicine.com
Human biology knowledge base	Background information on physiology, cell biology, genetics, biochemistry, immunology, pathology. (Resource of the Institute of Molecular Genetics of the 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 rubric	A resource of the Russian Ministry of Health, which hosts clinical recommendations developed and approved by medical professional non-profit organizations of the Russian Federation, as well as methodological guidelines, 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 a part of the unified state information system in the sphere of healthcare as a reference system. FEMB was created on the basis of the collections of the I.M. Sechenov Central Scientific Medical Library. I.M. Sechenov Central Scientific Medical Library.	free access	https://femb.ru/
Russian Medical Association	Professional Internet resource. Purpose: to promote effective professional activities of medical staff. Contains the charter, personalities, structure, rules of joining, information about the Russian Medical Union.	free access	http://www.rmass.ru/
Web medicine	The site presents a directory of professional medical resources, including links to the most authoritative thematic sites, journals, societies, as well as useful documents and programs. The site is intended for physicians, students, staff of medical universities and scientific institutions.	free access	http: //webmed.irkutsk.ru/
Databases			
World Health Organization	The site contains news, statistical data on the countries of the World Health Organization, newsletters, reports, WHO publications and much more.	free access	http://www.who.int/ru/
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 more	free access	https://edu.gov.ru/
Federal portal “Russian Education”	A single window of access to educational resources. This portal provides access to textbooks in all branches of medicine and health care.	free access	http: //www .edu.ru/
Polpred.com	Digital library system Business media. Media review	free access	https://polpred.com/news
Bibliographic databases			
DB “Russian Medicine”	Created in the CNMB, it covers the entire collection since 1988. The database contains bibliographic descriptions of articles from domestic journals and collections, dissertations and their abstracts, as well as domestic and foreign books, proceedings of institutes, conference proceedings, etc. Thematically, the database covers all fields 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. The PubMed database is an electronic search engine with free access to 30 million publications from 4800 indexed journals on medical topics. The database contains articles published from 1960 to the present day, including MEDLINE, PreMEDLINE, and NLM. Each year the portal is updated with more than 500 thousand new papers.	free access	http: //www .ncbi.nlm.nih.gov/pubmed/
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. Electronic versions of more than 2000 Russian scientific and technical journals are available on the eLIBRARY.RU platform, including more than 1000 open access journals.	Full functionality of the site is available after registration	http://elibrary.ru/defaultx.asp
Electronic Library of Dissertations (RGB)	At present, the Electronic Library of Dissertations of the RGB contains more than 919000 full texts of dissertations and abstracts.	free access	http://diss.rsl.ru/?menu=disscatalog/
Medline.ru	Biomedical portal for specialists. Biomedical journal.	free access	https://journal.scbmt.ru/

			jour/index
Official Internet portal of legal information	Unified official state information and legal resource in Russia	free access	http://pravo.gov.ru/

2. Amend and update the table in the section “Licensed and freely distributed software used in the educational process”.

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2.	MS Windows 10 Pro operating system	CONTRACT No. UT-368 of 21.09.2021
3.	MS Office	License number: 43234783, 67810502, 67580703, 64399692, 62795141, 61350919
4.	Kaspersky Endpoint Security for Business - Standard Russian Edition. 50-99 Node 2 year Educational Renewal License	Contract 165A dated 25.11.2022
5.	1C Accounting and 1C Salary	LICENSE CONTRACT 612/L of 02.02.2022 (additional license)
6.	1C: University PROF	LICENSE CONTRACT No. KrCB-004537 dated 19.12.2023
7.	1C: Library PROF	LICENSE CONTRACT No. 2281 dated 11.11.2020
8.	Consultant Plus	Contract No. 37-2C dated 27.03.2023
9.	Contour.Tolk	Contract No. K1029608/23 of 04.09.2023
10.	E-learning environment 3KL(Russian Moodle)	Contract No. 1362.4 dated 11.12.2023
11.	Astra Linux Common Edition	Contract No. 142 A of 21.09.2021
12.	Information system “Plans”	Contract No. 1338-23 dated 25.05.2023
13.	1C: Document Management	Contract No. 2191 dated 15.10.2020
14.	P7-Office	Contract No. 2 COP from 18.12.2020

List of freely distributed software

No. in order	List of freely distributed software	Links to the license agreement
1.	Yandex browser	Free of charge Yandex Browser Software License Agreement https://yandex.ru/legal/browser_agreement/
2.	Yandex.Teleconference	Free of charge Software License Agreement https://yandex.ru/legal/telemost_mobile_agreement/
3.	Dr.Web CureIt!	Free to distribute License Agreement: https://st.drweb.com/static/new-www/files/license_CureIt_ru.pdf
4.	OpenOffice	Freely distributable License: http://www.gnu.org/copyleft/lesser.html
5.	LibreOffice	Freely distributable License: https://ru.libreoffice.org/about-us/license/
6.	VK Calls	Freely distributable https://vk.com/licence
7.	Kaspersky Free Antivirus	Freely distributable https://products.s.kaspersky-labs.com/homeuser/Kaspersky4Win2021/21.16.6.467/english-0.207.0/3830343439337c44454c7c4e554c4c/kis_eula_en-in.txt

3. Amend section 3.3.1 (electronic and digital technologies) to add information on the following

documents prepared in 2023-2024 and approved at CCMC:

Vakhnenko Y.V. Electronic textbook “Diagnosis and treatment of secondary arterial hypertension” - Electronic environment AGMA. – https://educ-amursma.ru/course/view.php?id=199

Vakhnenko Y.V. Electronic textbook “Actual problems of rheumatology. Part 1” Electronic textbook - Electronic environment of ASMA. – https://educ-amursma.ru/course/view.php?id=199

Urazova G.E. Electronic textbook “Actual problems of rheumatology. Part 2” Electronic textbook - Electronic environment of ASMA. – https://educ-amursma.ru/course/view.php?id=199

Protocol of coordination of the working program of the discipline «Functional Diagnostic» for the implementation of interdisciplinary links with supporting disciplines

Department of Hospital Therapy with a course of pharmacology, **discipline «Functional Diagnostics»**, 5th year, Faculty of General Medicine. Excerpt from the working program:

Requirements for students: starting to study the discipline «Functional Diagnostic», students should have a basic knowledge of the following disciplines «Professional foreign language», «Histology, embryology, cytology», «Biology», «Physics, mathematics», «Normal physiology», «Pathophysiology», «Propaedeutic of internal diseases», «Emergency conditions in therapy», «Faculty therapy», «Polyclinic therapy».

No. in order	Name of disciplines	Name of the department where the discipline is studied	Name of sections	Signature of the head of the department with whom the coordination is carried out
1	**Professional foreign language**	Philosophy, History of Motherland and Foreign Language	Sections 1 ,2	
2	**Histology**	Histology and Biology	Sections 1, 2	
3	**Biology**	Histology and Biology	Sections 1 ,2	
4	**Physics, mathematics**	Medical Physics	Sections 1, 2	
5	**Normal physiology**	Physiology and pathophysiology	Sections 1, 2	
6	**Pathophysiology**	Physiology and pathophysiology	Sections 1, 2	
7	**Propaedeutic of internal diseases**	Propaedeutic of internal diseases	Sections 1, 2, 4	
8	**Emergency conditions in therapy**	Anesthesiology, reanimation, emergency therapy and emergency medical care	Sections 1, 2, 4	
9	**Faculty therapy**	Faculty and Polyclinic Therapy	Sections 1, 2, 4	
10	**Polyclinic therapy**	Faculty and Polyclinic Therapy	Sections 1, 2, 4	

Familiarization sheet

Position	FULL NAME.	Date	Caption

Sheet for registration of changes/additions

Changes/additions	Number sheet	Deadline for introducing the change	Caption	Date