



Ministry of Health of the Russian Federation
Federal State Budgetary Educational Institution of Higher education
"Dagestan State Medical University"
(FSBEI HE DSMU of the Health Ministry of Russia)



CONFIRMED by
Acting Vice-Rector for Academic Affairs,
Assoc.prof. D.A. Omarova

D.A. Omarova
« 31 » 08 / 2021.

**THE WORK PROGRAM OF THE DISCIPLINE,
including adapted
"Normal physiology»**

Discipline index on curriculum B1.O.24

Training (specialty) 31.05.01

Profile name (specialization) Medicine

Higher education level specialty

Graduate qualifications medical doctor

Faculty General Medicine

Department Normal Physiology

Education form Full-time

Year: 2

Term: **III - IV**

Total labor intensity (in credit units / hours): **8 un. / 288 hs**

Lectures: **48 hours.**

Practical (seminar) lessons: **126 hours**

Independent work: **78 hours**

Control form: exam in semester **IV**

Makhachkala – 2021

The work program of the discipline "Normal physiology" was developed in accordance with the Federal State Educational Standard of Higher Education in the direction of training (specialty) 05/31/01 General Medicine (higher education level - specialty), approved by the decree of the Education and Science Ministry of the Russian Federation No. 988 of August 12, 2020

The work program of the academic discipline was approved at a meeting of the department 26_08_2021, minutes № 1

The work program has been agreed by:

1. Director of the DSMU Library _____ (V.R. Musaeva)
2. Head of the Department of EMW and EQC _____ (A.M. Karimova)
3. Dean _____ (R.M. Ragimov)

Head of the Department

M.D. Professor _____ (R.M. Ragimov)

Work program developers:

1. Department Head, MD, Professor _____ (R.M. Ragimov)
2. Biological Sciences Associate Professor, Ph.D. _____ (N.M. Abdullaeva)

Reviewers:

L. D. Tsaturyan - Doctor of Medical Sciences, Professor, Head of Normal Physiology deptmt FSBEI HE StSMU Health Ministry of Russia

M.M. Gabibov - Doctor of Biological Sciences, Professor of Zoology and Physiology Department, FSBEI HE DSU

CONTENTS

1.	The purpose and objectives of mastering the discipline	
2.	Planned learning outcomes by discipline	
3.	Place of discipline in the structure of the educational program	
4.	The scope of the discipline and types of educational work	

5.	Content of the work program	
5.1.	Sections of the discipline and competencies that are formed during their study	
5.2.	Sections of the discipline, labor intensity by type of educational work	
5.3.	Thematic plan of lectures	
5.4.	Thematic plan of practical lessons	
5.5.	Laboratory works	
5.6.	Educational and methodological support for independent work in the discipline	
5.6.1.	Student's independent work in the discipline	
5.6.2.	Subject of abstract works	
5.6.3.	Methodical instructions for students on mastering the discipline	
6.	Evaluation tools for monitoring progress and intermediate certification based on the results of mastering the discipline	
6.1.	Current monitoring of progress	
6.1.1.	The list of competencies with an indication of the stages of their formation in the process of mastering the work program of the discipline	
6.1.2.	Examples of assessment tools for current and midterm monitoring of progress	
6.2.	Interim certification based on the results of mastering the discipline	
6.2.1.	Interim certification form	
6.2.2.	Interim certification procedure	
6.2.3.	Examples of questions to prepare for a test, exam	
6.2.4.	Ticket examples	
6.2.5.	The system for assessing the results of mastering the discipline, a description of the assessment scales, grading	
7.	Educational-methodical and informational support of the discipline	
7.1.	Main literature	
7.2.	Additional literature	
7.3.	Resources of the information and telecommunications network "Internet"	
7.4.	Information Technology	
8.	Logistics support	

9.	Discipline staffing	
10.	Using innovative (active and interactive) teaching methods	
11.	Methodological support of the discipline	
12.	Features of the organization of training in discipline for people with disabilities and people with disabilities	
12.1.	Training of people with disabilities	
12.2.	In order to master the curriculum of the discipline by disabled persons and persons with disabilities	
12.3.	Education of students with disabilities	
12.4.	The list of educational and methodological support for independent work of students in the discipline	
12.5.	Fund of assessment tools for intermediate certification of students in the discipline.	
12.5.1.	The list of funds of assessment tools, correlated with the planned results of the development of the educational program	
12.5.2.	Methodological materials defining the procedures for assessing knowledge, skills, abilities and (operational experience, characterizing the stages of competence formation)	
12.6.	The list of basic and additional educational literature necessary for mastering the discipline	
12.7.	Methodical instructions for students on mastering the discipline	
12.8.	Description of the material and technical base necessary for the implementation of the educational process in the discipline	
13.	Work program change sheet	
14.	<i>Appendix 1: The fund of the assessment tools</i>	
15.	<i>Appendix 2: Annotation of the work program of the discipline</i>	
16.	<i>Appendix 3: Study guide for practical exercises in 2 parts</i>	

1. THE PURPOSE AND OBJECTIVES OF MASTERING THE DISCIPLINE

The purpose - to form students' systemic knowledge about the vital activity of an integral organism and its individual parts, about the basic laws of functioning and the mechanisms of their regulation when interacting with each other and with environmental factors, about the physiological foundations of clinical and physiological research methods used in functional diagnostics and in the study integrative human activity.

Objectives:

- the formation of students' skills in analyzing the functions of a whole organism from the standpoint of integral physiology, analytical methodology and the foundations of holistic medicine;
- the formation of a systematic approach among students in understanding the physiological mechanisms underlying the interaction with environmental factors and the implementation of adaptive strategies of the human and animal organisms for the implementation of normal functions of the human body from the standpoint of the concept of functional systems;
- teaching students the methods and principles of the study of assessing the state of the regulatory and homeostatic systems of the body in the experiment, taking into account their applicability in clinical practice;
- teaching students to the laws of functioning of various systems of the human body and the peculiarities of intersystem interactions in the context of the implementation of purposeful activity from the position of the doctrine of adaptation and cross-adaptation;
- teaching students the methods of assessing the functional state of a person, the state of regulatory and homeostatic for different types of purposeful activity;
- teaching students the role of higher nervous activity in the regulation of human physiological functions and purposeful management of the body's reserve capabilities in conditions of norm and pathology;
- familiarization of students with the basic principles of modeling physiological processes and existing computer models (including biofeedback) for the study and purposeful control of visceral functions of the body;
- the formation of the fundamentals of clinical thinking in students based on the analysis of the nature and structure of interorgan and intersystem relationships from the standpoint of integral physiology for the future practical activities of a doctor.

2. PLANNED LEARNING OUTCOMES BY DISCIPLINE

Competencies formed in the process of studying the academic discipline:

Competency code and name (or of its part)	Competency achievement indicator code and name
General professional competencies (GPC)	
GPC-5: the ability to assess morphofunctional, physiological conditions and pathological processes in the human body for solving professional problems	All GPC5 - evaluates morpho-functional processes in physiological conditions
<p>To know:</p> <ul style="list-style-type: none"> - excitability and parameters of excitability; - membrane ion theory of the origin of biopotentials; - classification of nerve fibers; - constant polar action on excitable tissues; - the laws of irritation and the regularities of the conduction of excitation along the nerve fibers; - the value of registration of biopotentials in medicine (EMG, ECG, EEG); - the structure and functions of the myoneural synapse; - the structure of muscle fibers, sarcomeres; - the modern theory of the mechanism of muscle contraction ("theory of sliding threads" H. Huxley E. Huxley); - strength, work and muscle fatigue; - morpho-functional classification of neurons; - principles of feedback in the central nervous system; - types of synapses of the central nervous system and the classification of mediators; - the nature of EPSP and TPSP; - functional characteristics of various parts of the central nervous system. The nature of spinal shock; - vital centers of the medulla oblongata; - mechanisms of functioning and principles of regulation of endocrine cells and endocrine glands; - types and mechanisms of hormone action; - hypothalamic-pituitary neuroendocrine regulation of physiological functions; - the peculiarities of their interaction in the conditions of purposeful behavior and pathology; - the blood system and its role in maintaining and regulating the homeostatic constants of the body, blood function; - characteristics and functional features of physiological blood constants; - rules for blood transfusion; - the value of the biological sample during blood transfusion; - processes of hemostasis and modern ideas about the mechanisms of blood coagulation; - the main properties of the heart muscle; - cavities and valve apparatus of the heart; - the main mechanisms of regulation of the activity of the heart, the cardiac cycle; - the physiological role of the parts of the vascular system, regulation of vascular tone and systemic hemodynamics; - the relationship between volumetric blood flow and linear velocity at rest and physical activity; - mechanisms of filtration and reabsorption at the level of the microvasculature and their regulation; - neuro-humoral regulation of vascular tone; - ventilation of the lungs, lung volumes and capacities; - regulation of respiration, peculiarities of respiration in various conditions of existence; - digestion as a process necessary for the implementation of the energy and plastic functions of the body; - Pavlov's experiments on the physiology of digestion; - features of the functioning of various parts of the gastrointestinal tract. Digestive and non-digestive functions of the gastrointestinal tract; - mechanisms of hunger and satiety; - methods of research of the digestive system; - the main processes and mechanisms for maintaining the constancy of body temperature; - the main stages of urine formation and mechanisms of their regulation; - the principle of operation of the apparatus "Artificial kidney"; - the main non-excretory (homeostatic) functions of the kidneys; - the main morpho-functional features of the organization of various departments of sensory systems; - theories of color perception, perception of sound vibrations, anomalies of refraction of vision; - types of higher nervous activity according to Hippocrates and I.P. Pavlov; - memory mechanisms, sleep phases and cortical rhythms. 	

To be able to:

- prepare a neuromuscular preparation;
- determine the time of the reflex according to Turk;
- to reproduce the experience of central braking I.M. Sechenov;
- determine blood groups;
- determine ESR according to Panchenkov;
- determine the amount of hemoglobin in blood by the Sali method;
- interpret the general blood test and leukocyte formula;
- determine the Rh factor; determine the specific gravity of urine (urometry);
- conduct and analyze the ECG;
- analyze the pulse;
- to carry out spirometry and breath tests of Shtange and Gencha;
- calculate the basal metabolic rate according to the table and the Harris-Benedict formula, the approximate formula, data on the body surface;
- calculate the specific-dynamic action of food according to the formula;
- calculate the student's food ration;
- carry out olfactometry;
- to carry out a density measurement;
- to carry out esthesiometry;
- to reproduce the experiments of Galvani;
- to examine tendon reflexes in humans (knee, Achilles);
- examine samples to detect cerebellar ataxia (Romberg, fingernose, knee-calcaneal);
- to examine orthostatic and clinostatic tests.

To possess:

- the preparing technique of the frog neuromuscular preparation;
- the method for determining the time of the reflex according to Türk;
- a technique for determining muscle strength (using hand and back dynamometers);
- a method for determining blood groups and Rh factor using tsoliclones;
- the method for determining blood pressure;
- probing and counting arterial pulse;
- the technique of conducting pulse oximetry;
- methodology for calculating NPV;
- the method for determining the Ashner's eye-cardiac reflex;
- the technique of determining the acuity and fields of vision;
- a method for determining color perception;
- the technique of counting the number of erythrocytes and leukocytes;
- determination of blood coagulation time, ESR, hemoglobin content);
- a technique for assessing the osmotic stability of erythrocytes;
- a methodology for assessing the results of a general urine analysis;
- methodology for determining the types of HNA (Eysenck test).

3. Place of discipline in the structure of the educational program

Discipline "Normal Physiology" refers to the basic part of the B1 curriculum in the specialty 05/31/01 - "General Medicine"

The material of the discipline is based on the knowledge and skills previously acquired by students in biology, cytology, chemistry, physics, histology, embryology, biochemistry, anatomy, Latin language, physical culture and sports.

Sections of the discipline "Normal physiology"

№	Name of sections
1	Introduction to the subject. Physiology of excitable tissues
2	General and specific neurophysiology. Autonomic nervous system
3	Physiology of the endocrine system
4	Physiology of the blood system
5	Physiology of the cardiovascular system
6	Respiratory physiology
7	Digestive physiology
8	Physiology of metabolism and energy
9	Physiology of nutrition and thermoregulation
10	Physiology of the excretory system
11	Analyzer Physiology
12	Physiology of higher nervous activity

Interdisciplinary links with subsequent disciplines

№	The name of the provided (subsequent) disciplines	1	2	3	4	5	6	7	8	9	10	11	12
1	Propedeutics of Internal Diseases				+	+	+	+	+	+	+		
2	Ophthalmology		+									+	+
3	Otorhinolaryngology		+				+	+				+	+
4	obstetrics and gynecology				+	+	+						
5	Pediatrics		+	+	+	+	+		+	+			+
6	Neurology, medical genetics, neurosurgery	+	+	+								+	+
7	Psychiatry, medical psychology												+
8	Forensic Medicine				+		+	+					
9	Medical rehabilitation	+	+	+		+	+					+	+

10	Hospital therapy			+	+	+	+	+	+	+	+		
	Faculty therapy			+	+	+	+	+	+	+	+		
11	Immunology				+	+	+	+					
12	Phthisiology						+						
13	general surgery		+		+		+		+	+			+
14	Anesthesiology, resuscitation, intensive care		+		+	+	+			+	+		
15	Faculty surgery			+			+	+					
16	Hospital surgery			+			+	+					
19	Dentistry							+	+				+
20	Hygiene							+	+	+	+		
21	Radiation diagnostics												
22	Endocrinology		+	+		+	+	+	+	+	+		
23	Urology											+	

4. SCOPE OF DISCIPLINE AND TYPES OF EDUCATIONAL WORK

The total workload of the course is 8 credit units.

Types of work		Total hours	Number of hours in semesters	
			III	IV
		2	3	4
Contact work (total), including:		176	72	104
Classroom work				
Lectures (L)		48	18	30
Practical lessons (PL),		126	54	72
Seminars (S)				
Laboratory work (LW)				
Extracurricular work				
Student's independent work (SRO)		76	36	42
Type of intermediate certification	exam (E)	6	2	4
TOTAL:		432	182	252
hour				

total labor intensity hour.	CREDITS	8	3	5
-----------------------------	---------	---	---	---

5. CONTENT OF THE DISCIPLINE WORK PROGRAM

5.1 Sections of the discipline and competencies that are formed during their study

No section	Supervised Competency Code Achievement Indicator	Section name	Section Contents
1	2	3	4
1	GPC-5/AI-1	Introduction to the subject. Physiology of excitable tissues	<p>Normal physiology is a science that studies the life processes of a healthy person. The concept of an organism, its constituent elements. Levels of the morpho-functional organization of the human body. Cell, its functions. Body tissues (epithelial, connective, muscular and nervous), their main functional features. The concept of an organ, its structural and functional unit of an organ. Physiological function, this is the norm. Relationship between structure and function. The unity of the body and the external environment. The concept of the internal environment of the body and its components (blood, lymph, intercellular fluid). The concept of physiological constants. Concepts of soft and hard constants. The concepts of homeostasis, homeokinesis. Physiological adaptive response. Analytical and systemic approaches to the study of physiological processes and functions. A brief description of the stages of development of normal physiology: empirical, anatomical-physiological, functional (the fundamental role of the works of W. Harvey, R. Descartes). Formation and development of physiology in the XIX-XX centuries (the significance of the scientific works of W. Harvey, R. Descartes, C. Bernard, E. Dubois-Reymond, G. Helmholtz, C. Sherrington, W. Kennon). The contribution of foreign and domestic physiologists to the development of world physiological science (D.V. Ovsiyannikov, I.M. Sechenov, N.A. Mislavsky, I.P. Pavlov, N.E. Vvedensky, A.A. Ukhtomsky, A.F. Samoilov, L.A. Orbeli, KM Bykov, E.A. Hasratyan, V.V. Larin, V.N. Chernigovsky, G.I. Kositsky, L.S. Stern, P.K. Anokhin, P.V. Simonov, Sudakov).</p> <p>Physiological foundations of functions. Irritability as the basis of tissue reaction to irritation. Classification of irritants. The concept of excitability and excitation. Excitation and inhibition as an active state of excitable tissue. Their physiological rôle.</p> <p>Systemic organization of functions (I.P. Pavlov, P.K. Anokhin). System concept. Levels of systemic organization. Physiological system.</p> <p>The structure and function of biological membranes. Types of membrane transport proteins, classification and properties of ion channels. The history of the discovery of bioelectric phenomena in living tissues (L. Galvani, E. Dubois-Reymond, K. Matteuchi). Membrane and ionic mechanisms of the origin of biopotentials at rest. Methods for registration of membrane potentials.</p> <p>Physiological properties of excitable tissues.</p> <p>Types of irritation of excitable tissues. Features of local and spreading processes of excitement.</p> <p>Electrophysiological characteristics of the excitation process (A. Hodgkin, A. Huxley, B. Katz). Potential actions and its phases. Ionic excitation mechanisms. Changes in the permeability of the cell membrane upon excitation. Excitement and excitability. Change in excitability when excited. Characteristics of refractoriness and exaltation.</p> <p>The laws of irritation of single and integral excitable structures: "strength", "all</p>

			<p>or nothing", "strength-duration" (Weiss-Lapik). The concept of rheobase, chronaxy, useful time.</p> <p>The laws of irritation under the action of direct current on excitable tissues: physiological electroton, polar action of direct current (E. Pfluger). The concept of kat- and anelectroton, cathodic depression, anodic exaltation. The concept of parabiosis (N.E. Vvedensky), phases of development of parabiosis.</p> <p>Change in tissue excitability with a slow increase in the depolarizing current, the property of accommodation.</p> <p>Classification of nerve fibers. Mechanisms of the conduction of excitation along the nerve fibers. The laws of the conduction of excitation in the nerves.</p> <p>Types of transmission of signatures between excitable cells. Synapse concept. Synapse classification. Functional properties of electrical and chemical synapses.</p> <p>Signaling mechanism at a chemical synapse. Types of synaptic neurotransmitters and neuromodulators. Features of signal transmission in neuromuscular and central synapses; in excitatory and inhibitory synapses.</p> <p>Physical and physiological properties of skeletal muscle. The concept of a motor unit, physiological characteristics of fast and slow motor units. Electromyography.</p> <p>Characteristics of the types and modes of muscle contraction. The temporal relationship of the cycle of excitation, excitability and a single contraction of skeletal muscle fiber.</p> <p>The mechanism of tetanic contraction. Conditions for the occurrence of optimum and pessimum.</p> <p>Features of the structure of the membrane and sarcomeres of skeletal muscle fibers. The mechanism of muscle contraction.</p> <p>Electromechanical interfacing. Dependence of the strength of muscle contraction on its original length.</p> <p>The energy of muscle contraction. ATP resynthesis pathways. The power and capacity of the body's energy systems. Functional energy supply system for muscle activity.</p> <p>Physiological features and properties of smooth muscles. Their importance in the myogenic regulation of the motor functions of internal organs.</p>
2.	GPC-5/AI-1	General and particular neurophysiology.	<p>Morphofunctional organization of a neuron as a unit of the nervous system. The emergence of local and spreading excitations in the neuron. Integrative function of a neuron. Classification of neurons. The concept of neural networks, their types. Block-modular concept of the activity of the central nervous system. The concept of the nerve center in the wide and narrow sense of the word. Physiological properties of nerve centers Basic principles of the propagation of excitation in nerve centers, in neural networks.</p> <p>Principles of coordination activity of the central nervous system Reflex principle of the activity of the nervous system and the principles of reflex theory. Reflex is the main mechanism of the body's adaptive response to changes in the conditions of the internal and external environment. Links, components of the morphological basis of the reflex from the positions of R. Descartes and P.K. Anokhin. The morphological basis of the simplest somatic reflex. The concept of the adaptive result of reflex activity. Types of reflexes.</p> <p>The value of inhibition in the central nervous system. The history of the discovery of peripheral and central inhibition.</p> <p>Braking functions (protective and coordinating). Types of central inhibition (depolarization and hyperpolarization: presynaptic and postsynaptic; forward, lateral, return, reciprocal).</p> <p>Unitary-chemical and binary-chemical theory of central inhibition.</p> <p>Mechanisms of interaction of excitatory and inhibitory influences on a neuron. Mechanisms of depolarizing (pessimal) and hyperpolarizing inhibition of a neuron.</p> <p>The role of various parts of the central nervous system in the regulation of phys-</p>

		<p>iological functions. Afferent, efferent and associative areas of the cerebral cortex. Columnar organization of the cortex. Irradiation and convergence of excitations of various modalities in the cortex. The role of inhibitory neurons in providing analytical and synthetic activity of the cortex.</p> <p>Bark plasticity (E.A. Asratyan). Cortical-subcortical and cortical-visceral relationships (K.M.Bykov).</p> <p>Functional asymmetry of the hemispheres in humans. The concept of muscle tone. Reflex nature and functional significance of muscle tone.</p> <p>Types of proprioceptors. their localization, structure, role in maintaining muscle tone. The morphological basis of the tendon reflex. The mechanism of occurrence and regulation of muscle tone at the spinal level (spinal tone).</p> <p>Ways and mechanisms of the influence of the structures of the medulla oblongata and cerebellum on muscle tone. The mechanism of occurrence of the state of decerebral rigidity (contractile tone) in a bulbar animal.</p> <p>Midbrain structures involved in the formation of mesencephalic tone. Plastic tone in a diencephalic animal.</p> <p>Participation of the components of the striapallidal system and the cerebral cortex in the regulation of muscle tone.</p> <p>The concept of tonic reflex. Types of tonic reflexes (static and statokinetic). Conditions for their occurrence. Participation of structures of the spinal cord, medulla oblongata and midbrain in their implementation.</p> <p>Autonomic (autonomic) nervous system. Its functions.</p> <p>Physiological features of the sympathetic, parasympathetic and metasomatic divisions of the autonomic nervous system. The main types of mediators and receptors.</p> <p>The role of various parts of the central nervous system (spinal, tabloid, mesencephalic centers, hypothalamus, cerebellum, reticular formation, cerebral cortex) in the regulation of the functions of the autonomic nervous system.</p> <p>Concept of typological features of autonomic regulation of hemodynamics. Methods for determining dysfunctions of the autonomic nervous system.</p> <p>Types of responses to emotional stress by indicators of the autonomic nervous system.</p>
3.	GPC-5/AI-1	<p>Physiology of the endocrine system</p> <p>The main components of the endocrine system (local and diffuse endocrine systems). The concept of endocrine glands, Biopotentials of glandulocytes. Secretory cycle. Types of endocrine glands. Central and peripheral glands. Working systems of endocrine glands (hypothalamic-pituitary, sympatho-adrenal, gastroenteropancreatic, etc.).</p> <p>The concept of endocrine and neuroendocrine cells. Types of biologically active substances: hormones, hormone-like peptides, neurohormones, neurotransmitters, modulators.</p> <p>Functional signs of hormones that distinguish them from other biologically active substances. Classification of hormones: by chemical nature (protein-peptide, steroid, amino acid derivatives), functional (tropic, trigger, effector).</p> <p>Forms of transmission of regulatory influences using biologically active substances (autocrine, isocrine, paracrine, endocrine, neurocrine).</p> <p>Methods for transporting hormones by blood. Importance of transport of hormones in a bound state.</p> <p>Mechanisms of hormone action on target cells (membrane, cytosolic-nuclear).</p> <p>Types of physiological action (metabolic, morphogenetic, kinetic, corrective) and the importance of hormones.</p> <p>Nervous (trans- and parahypophyseal) and humoral regulation of the activity of the endocrine glands. The role of negative feedbacks (ultrashort, short, long) in the self-regulation of the endocrine glands. Hormones of the endocrine glands (hypothalamus, pituitary gland, pineal gland, thyroid, thymus, parathyroid, pancreas, adrenal glands, genital, placenta), their effect on metabolic processes and body functions.</p> <p>Stress, mechanisms, role in life processes. The role of G. Selye and domestic</p>

			<p>scientists in the development of the theory of stress. Stress as an adaptation phase. Short-term and long-term adaptation. Cross-adaptation and its role in clinical practice.</p>
4.	GPC-5/AI-1	Physiology of the blood system	<p>Concept of blood, blood system. The amount of circulating blood, its composition, Functions of the blood.</p> <p>Basic blood constants, their value and functional significance. The concept of osmotic blood pressure.</p> <p>Concept of the self-regulatory principle of the mechanism for maintaining blood constants. Functional systems that maintain a constant blood pH and osmotic pressure.</p> <p>The concept of hemolysis, its types and plasmolysis.</p> <p>Corpuscular elements of blood, their physiological significance. The concept of erythro-, leuko- and thrombocytopoiesis, their nervous and humoral regulation. Hemoglobin, its compounds, functional significance. Lymph, its composition and function.</p> <p>An idea of the protective function of the blood and its manifestations (immune reactions, blood coagulation). Blood groups as a manifestation of the body's immune specificity. Varieties of blood group systems (ABO, Rh - belonging). Their importance for obstetric and surgical practice.</p> <p>The process of blood coagulation (hemostasis), its significance.</p> <p>The main factors involved in the process of blood coagulation (tissue, plasma, thrombotic, erythro- and leukocyte), their functional characteristics.</p> <p>Concept of external (tissue) and internal (blood) blood coagulation systems, phases of blood coagulation, processes of retraction and fibrinolysis.</p> <p>Factors that accelerate and slow down blood clotting.</p> <p>The concept of the first and second anticoagulant blood systems. An understanding of the principles of their functioning.</p> <p>The concept of a functional system that maintains the liquid state of the blood. Coagulation, anticoagulant and fibrinolytic blood systems.</p>
5	GPC-5/AI-1	Physiology of the cardiovascular system	<p>The concept of the physiological circulatory system (cardiovascular system). Pumping (pumping function of the heart).</p> <p>Morpho-functional features of the organization of the heart. Typical and atypical (P- and T-cells) cardiomyocytes, cardiac conduction system, valve apparatus, heart cavities.</p> <p>Physical and physiological properties of the heart muscle. The concept of functional syncytium for the heart.</p> <p>The emergence and spread of excitement in the heart. Automation, its nature, centers and gradient. Ionic mechanisms of excitation of atypical myocardiocytes. Mechanisms of slow diastolic depolarization.</p> <p>Changes in excitability upon excitation of typical cardiomyocytes. Electromechanical interfacing. Extrasystole. Compensatory pause.</p> <p>The cardiac cycle, its phase structure. Changes in the tone of the muscular walls of the heart cavities, changes in their volumes, blood pressure and the state of the valve apparatus in different phases of the cardiocycle.</p> <p>The idea of chrono-, batmo-, dromo-, ino- and tonotropic effects as manifestations of regulatory influences on the work of the heart.</p> <p>Types of regulation of cardiac activity. Autoregulation: myogenic (hetero- and homeometric) and neurogenic mechanisms. Patterns of manifestations of myogenic autoregulation (Frank-Starling's law; Anrep's law; rhythmic-inotropic dependence).</p> <p>Nervous and humoral mechanisms of extracardiac regulation of cardiac activity. Humoral effects of hormones, electrolytes, mediators and other factors on the parameters of the heart.</p> <p>Nervous regulation Features of the sympathetic and parasympathetic innervation of the heart muscle. Mechanisms of parasympathetic and sympathetic influences on the work of the heart. Reflex regulation of the heart.</p> <p>Nervous centers for the regulation of cardiac activity. Endocrine function of the</p>

		<p>heart. Influence of atrio-sodium-uretic peptide on vascular tone and urine formation.</p> <p>Functional classification of blood vessels (elastic, resistive, exchangeable, capacitive, shunting). Basic laws of hydrodynamics and their use to explain physiological functions and patterns of movement of blood through the vessels. Factors that ensure the movement of blood through the vessels.</p> <p>Peripheral circulation parameters (pressure, blood, linear and volumetric blood flow velocity, blood circulation time). Change in resistance, blood pressure and blood flow rate in different parts of the vascular bed.</p> <p>Nervous, humoral and myogenic regulation of vascular tone. The concept of basal vascular tone and autoregulation of vascular tone. Vasomotor center (pressor and depressor departments). Peripheral and central influences on the activity of neurons in the vaso-motor center.</p> <p>The concepts of systolic, diastolic, pulse and mean arterial pressure. Factors that determine the value of blood pressure. A functional system that maintains a normal level of blood pressure.</p> <p>Microcirculation and its role in the mechanisms of exchange of liquid and various substances between blood and tissues. Micro-circulation vascular module.</p> <p>Capillary blood flow. Types of capillaries. Mechanisms of transcapillary exchange in the capillaries of the large and pulmonary circulation. External manifestations of the activity of the heart (electrical, sound, mechanical).</p> <p>Mechanisms of EMF of the heart. Einthoven's theory. Methods for recording electrical manifestations of cardiac activity. The main ECG leads in humans (standard, enhanced, chest). Bipolar and monopolar ECG leads.</p> <p>Structural analysis of normal ECG in II standard lead. QRS, complexes, intervals, segments; their time and amplitude characteristics.</p> <p>Propagation of excitation in the myocardium (waves of depolarization and repolarization). De- and repolarization potentials at the active electrode. Vector theory of ECG genesis.</p> <p>The electrical axis of the heart. Physiological options for its location (normal, horizontal and vertical).</p> <p>Methods for studying the sound manifestations of heart activity (auscultation, phonocardiography). The origin of heart sounds, their types and places of the best listening. Research methods of arterial (sphygmography) and venous (phlebography) pulse. Clinical value of human pulse.</p> <p>Methods for measuring blood pressure (direct and indirect). Methods of Riva-Rocchi and Korotkov, the technique of their application. Understanding vascular tones, understanding the mechanisms of their occurrence.</p> <p>Determination of the index of functional changes (IFI) as a method of express diagnostics of the state of the cardiovascular system.</p> <p>Variation heart rate measurement method. Statistical analysis of the ECG, its use to assess the nature of regulatory disturbances to the heart rate.</p> <p>Cardiac activity during exercise. Cardiac output is an integral indicator of the work of the heart. The mechanism of changes in cardiac output during exercise. Changes in the structure of the heart rate in conditions of physically intense activity.</p> <p>Regulation of vascular tone during exercise. Mechanisms for enhancing venous return during muscular work (venous, muscular, respiratory 'pumps'). Methods for assessing a person's physical working ability by heart performance indicators: Harvard step test, PWC170 (testing methodology, estimates for middle-aged people).</p>
--	--	--

6.	GPC-5/AI-1	Respiratory physiology	<p>The importance of breathing for the body. The main stages of the process. External respiration. Biomechanics of inhalation and exhalation. The pressure in the pleural cavity, its changes during inhalation and exhalation. Pulmonary volumes and capacities. Reserve capabilities of the respiratory system. Spirometry, spirometry.</p> <p>The composition of the inhaled, exhaled and alveolar air. Anatomical, physiological and functional dead spaces. Ventilation-perfusion coefficients, their importance in clinical practice.</p> <p>Air-blood barrier. Diffusion capacity of the lungs. Transport of gases by blood. Oxyhemoglobin dissociation graph. Factors affecting the formation and dissociation of oxyhemoglobin. Blood oxygen capacity concept.</p> <p>Nasal and oral breathing, their features. Functional connection of the processes of breathing, chewing and swallowing. Speech breathing.</p> <p>The concept of the respiratory center in the wide and narrow sense of the word. Representation of the localization and organization of the structure of the respiratory center in the broad sense of the word Types of respiratory neurons of the medulla oblongata, their automation.</p> <p>The role of various receptors and parts of the respiratory center in the mechanisms of changing the phases of respiration. The concept of the regulation of respiration according to the principle of perturbation and the principle of deviation.</p> <p>Protective breathing reflexes.</p> <p>The mechanism of the newborn's first breath.</p> <p>Breathing at high and low barometric pressure.</p> <p>FUS scheme, ensuring the maintenance of the constancy of the gas environment of the body.</p> <p>Breathing in conditions of physical activity. Estimation of the minute breathing volume. Regulation of breathing during muscular work (humoral and nervous mechanisms). Maximum oxygen consumption (MOC). The relationship between oxygen consumption and heart rate. True steady state. Oxygen demand, oxygen consumption and oxygen demand during exercise.</p>
7.	GPC-5/AI-1	Digestive physiology	<p>Digestion, its meaning, types and forms.</p> <p>Neuro-humoral mechanisms of hunger and satiety.</p> <p>Analysis of the components of the functional system for maintaining a constant level of nutrients in the blood.</p> <p>Regularities of the organization of the activity of the gastrointestinal tract according to the principle of the digestive conveyor.</p> <p>General principles of neuro-humoral regulation of the functions of the digestive tract.</p> <p>Chewing, its nature, self-regulation. Features of chewing when chewing food of different consistency. Masticatiography, masticogram analysis.</p> <p>Salivation and salivation. Nervous and humoral mechanisms of regulation of these processes. Phases of salivation, salivary reflex, adaptive nature of salivation.</p> <p>Swallowing, its phases and mechanisms.</p> <p>Functions of the stomach. Quantity, composition and properties of gastric juice. The value of hydrochloric acid and other components of gastric juice. Phases of gastric secretion, their neuro-humoral mechanisms.</p> <p>An idea of the features of experimental gastric operations and their use for the study of nervous and humoral influences on gastric secretion.</p> <p>Motor activity of the stomach. Nervous and humoral factors affecting the motor and evacuation functions of the stomach.</p> <p>Significance and role of digestion in the duodenum.</p> <p>Pancreas functions.</p> <p>Amount, composition and properties of pancreatic juice. Enzymes of subgastric juice, secreted in the active state and in the form of zimogens.</p> <p>Mechanisms of regulation of pancreatic secretion. Contours of self-regulation of</p>

			<p>pancreatic secretion, their meaning.</p> <p>Liver function.</p> <p>Bile, its quantity, composition, importance for digestion. Mechanisms of bile formation, deposition and bile secretion, their regulation. Intestinal hepatic recirculation of bile acids.</p> <p>Significance and role of digestion in the small intestine.</p> <p>The mechanism of intestinal juice formation. Quantity, property, enzymatic composition of intestinal juice. Regulation of the separation of intestinal juice.</p> <p>Cavity and membrane digestion, their relationship and severity in various parts of the gastrointestinal tract. Intracellular digestion.</p> <p>Immunocompetent cells of the gastrointestinal tract.</p> <p>Motor activity of the small and large intestine, its features, meaning, regulation mechanisms.</p> <p>Features of digestion, the importance of microflora in this process. Enzyme composition of colon juice. The act of defecation as an end result of digestion in the colon.</p> <p>Absorption of digestive products in various parts of the digestive tract, its mechanisms.</p>
8.	GPC-5/AI-1	Physiology of metabolism and energy	<p>Metabolism is the main condition for ensuring vital activity and maintaining homeostasis. The plastic and energetic role of nutrients. The processes of assimilation and dissimulation of substances. The exchange of proteins, fats and carbohydrates, their regulation.</p> <p>Regulation of the content of nutrients in the body.</p> <p>The value of water for the body. Concept of the regulation of water and mineral metabolism.</p> <p>The concept of the energy balance of the body. Caloric value of various nutrients. Methods of direct and indirect (complete and incomplete gas analysis) calorimetry.</p> <p>The concept of caloric value, respiratory coefficient and caloric oxygen equivalent, their values for different types of oxidized nutrients. Daily exchange and its components. Basal metabolic rate, conditions for determining the basal metabolic rate, factors affecting its value. Specific dynamic action of nutrients. Work increase, work exchange. The amount of labor exchange for various types of labor.</p>
9.	GPC-5/AI-1	Physiology of nutrition and thermoregulation	<p>Physiology of nutrition. The principles of organizing a balanced diet. Daily food ration and basic requirements for it. The norms of nutrients in the daily diet in accordance with age, profession and other factors affecting metabolic processes.</p> <p>Balanced diet. Diet.</p> <p>Thermoregulation concept. Heat products. Heat transfer.</p> <p>The constancy of the temperature of the internal environment of the body, as a necessary condition for the normal course of metabolic processes.</p> <p>The temperature scheme of the body, its daily fluctuations. Poikilothermia, homothermia, hibernation.</p> <p>A functional system that maintains a constant temperature of the internal environment of the body.</p>
10	GPC-5/AI-1	Physiology of the excretory system	<p>The concept of selection, its role in maintaining homeostasis.</p> <p>The kidney is the main excretory organ. Morpho-functional characteristics of the nephron, features of its blood supply.</p> <p>Glomerular filtration mechanism, its regulation.</p> <p>Primary urine, the difference between its composition and blood plasma.</p> <p>Reabsorption: mandatory (obligatory) and selective (optional).</p> <p>Active and passive processes underlying reabsorption. The concept of threshold and non-threshold substances.</p> <p>Rotary-countercurrent mechanism of urine concentration at the level of Henle's loop and collecting duct.</p> <p>Regulatory mechanisms of the reabsorption process. The role of the main humoral factors: aldosterone and anti-diuretic hormone.</p>

			<p>Secretion in the renal tubules. Secondary urine.</p> <p>Understanding of the homeostatic functions of the kidneys (regulation of fluid volume, osmotic pressure, acid-base balance, the amount of inorganic and organic substances, blood pressure, hematopoiesis).</p> <p>The mechanism of urination, its regulation.</p>
11	GPC-5/AI-1	Analyzer Physiology	<p>Sensory system concept. The concept of the analyzer from the positions of the teachings of I.P. Pavlova. Correlation of the concepts "sensor system" and "analyzers".</p> <p>The concept of the sense organ. Concept of the main and auxiliary structures of the sense organ.</p> <p>The concept of the peripheral (receptor) part of the sensory system, receptor, receptive field of the neuron.</p> <p>Functional properties and features of receptors: specificity, high excitability, low accommodation, adaptability; rhythmic generation of excitation impulses.</p> <p>Classification of receptors according to the criteria: reception of internal or external stimuli; the nature of the adequate stimulus: the nature of sensations; modalities; the threshold of irritation; speed of adaptation; the connection of the receptor with the sensory neuron.</p> <p>Receptor excitation mechanism. Receptor and generator potentials. Signal coding in receptors.</p> <p>Functional properties and features of the organization of the conduction department of the sensory system (multilevel, multichannel, presence of "sensory funnels", specific and non-specific ways of transmitting information). The concept of the three-neuronal organization of the conduction department. Participation of the conductor department in conducting and processing afferent excitations.</p> <p>Features of the organization of the cortical section of the sensory system. Functional differences of neurons that make up different cortical zones. The idea of mono- and polymodality of neurons, of the mechanism of interaction of sensory systems (convergence and divergence of excitations, lateral and recurrent inhibition, mediator interaction, synthesis of synaptic receptors).</p> <p>Information coding in various departments of sensory systems. The ratio of the intensity of irritation and the intensity of sensation. Weber-Fechner law. The main ways of regulating the activity of sensory systems based on the use of different forms of inhibition of descending influences from the overlying divisions to the lower ones. Functional mobility concept. Adaptation of sensory systems.</p> <p>Morpho-functional characteristics of the parts of the visual sensory system.</p> <p>The concept of visual field and visual acuity. Methods for their determination.</p> <p>Refraction, accommodation and adaptation of the eye. The mechanisms of these processes, their anomalies (astigmatism, myopia, hyperopia, presbyopia). Pupillary reflex.</p> <p>Mechanisms of reception and color perception. The main types of color perception disorders.</p> <p>Auditory sensory system. Sound-collecting formations, sound-conducting pathways and sound-receiving apparatus of the auditory sensory system. Sound reception mechanisms. Binaural hearing. Research methods of the auditory sensory system.</p> <p>General morphological and functional organization of the divisions of the skin sensory system. Tactile and temperature sensory systems as its components. Classification of tactile receptors, their structural and functional differences. Research methods of the tactile sensory system. The concept of the spatial threshold of tactile sensitivity. Thermoreceptor classification. Methods for studying the temperature sensor system.</p> <p>General morphological and functional organization of the divisions of the gustatory sensory system. Gustatory sensory receptors. Taste bud, taste buds. Types of taste buds of the tongue. The mechanism of reception and perception of taste. Methods for the study of the gustatory sensory system (density measurement and functional mobility).</p>

			<p>General morphological and functional organization of the departments of the olfactory sensory system. The mechanism of reception and perception of smell. Methods for studying the olfactory sensory system (olfactometry). The role of the interaction of the olfactory and other sensory beams in the formation of gustatory sensations.</p> <p>The concept of pain, nociception. Pain functions. Classification of pain. Morpho-functional characteristics of the divisions of the pain sensory system. An understanding of the theories of the mechanism of the onset of pain (intensity, synchronization of the afferent flow, specificity, gate control, generators). Pain as an integrative reaction of the body to the damaging effect of an irritant. Pain response components.</p> <p>The role of the thalamus and cerebral cortex in the integration and analysis of pain excitement. Sensory-discriminative and semantic analysis of damaging effects.</p> <p>The concepts of antinociception and antinociceptive system (ANCS). Components and functions of ANCS.</p> <p>ANCS levels: a system of descending inhibitory control of primary afferents and first relay cores; limbic-hypothalamic level; cortical level (secondary somatosensory and orbitofrontal areas of the cerebral cortex).</p> <p>Neurochemical and neurophysiological mechanisms of ANCS. Prescription and postsynaptic changes in MRI activation of ANCS.</p> <p>Pain threshold concept. Algometry.</p> <p>Physiological bases of pain relief.</p>
12	GPC-5/AI-1	Physiology of higher nervous activity	<p>HNA concept. The idea of the manifestations of HNA (congenital and acquired forms of behavior, higher mental functions).</p> <p>The concept of a conditioned reflex. The history of the discovery of conditioned reflexes. The value of the works of I.P. Pavlov and his followers in the creation of the doctrine of conditioned reflexes and the physiology of HNA.</p> <p>Comparative characteristics of conditioned and unconditioned reflexes. The value of conditioned reflexes in the adaptation of animals and humans to the conditions of existence.</p> <p>The rules and stages of the development of conditioned reflexes. Classification of conditioned reflexes according to the criteria: the ratio of the nature of conditioned and unconditioned stimuli (natural and artificial); the biological significance of the unconditioned stimulus (food, defensive, etc.); the type of receptors excited by a conditioned stimulus (sound, light, etc.); the relationship of the conditioned stimulus to the first or second signaling systems; the complexity of the conditioned reflex (reflexes of 1, 2, 3, etc. orders); the nature of changes in the activity of the body (positive, negative); the ratio of the time of action of the conditioned and unconditioned stimuli (cash, delayed, trace).</p> <p>Temporary connection concept. Pavlovian and modern ideas about the levels of localization of temporary communication and the mechanisms of its formation.</p> <p>Inhibition in HNA, its types: unconditional (transcendental and external), conditional (extinguishing, differentiated, conditional brake, delayed), conditions of their occurrence. Modern understanding of the mechanisms of inhibition in the HNA. The importance of inhibition of conditioned reflexes for the organization of human adaptive activity.</p> <p>The concept of the type of HNA (according to I.P. Pavlov). Classification and characteristics of the types of HNA. The role of types of HNA and other individual-typological characteristics of a person in the implementation of adaptive activity</p> <p>Concepts of the psyche and higher mental functions. K of basic mental functions (sensation, perception, representation, attention, emotion, motivation, memory, speech, thinking, consciousness).</p> <p>The concept of sensation. Concept of the nature of sensation.</p> <p>Perception concept. Concept of its mechanism.</p> <p>Attention concept. Kinds of attention. An understanding of the mechanisms of</p>

		<p>attention from the standpoint of Pavlov, Ukhtomsky and modern science. Physiological correlates of attention.</p> <p>Motivation concept. Classification of motivations. The idea of the mechanism of their occurrence. The role of the hypothalamus and cerebral cortex in this process.</p> <p>Emotion concept. Kinds of emotions. The idea of the mechanism of their occurrence. The role of various brain structures in the formation of emotional states. The value of emotions for the organization of behavior.</p> <p>Memory concept. Types of memory. Concept of the mechanisms of short-term and long-term memory.</p> <p>Thinking concept. Types of thinking. The role of various brain structures in the implementation of the thinking process. Development of abstract thinking in human ontogenesis.</p> <p>Speech concept. Types of speech and functions of speech. The idea of the mechanisms of speech, functional asymmetry of the cerebral cortex, associated with the development of speech in humans.</p> <p>The concept of consciousness. The idea of the sub- and superconsciousness, their relationship with consciousness.</p> <p>The idea of physiological and psychophysiological methods of studying mental functions.</p> <p>The concept of purposeful behavior. Analysis of the components of the functional system of the behavioral act.</p>
--	--	---

5.2. Sections of the discipline, labor intensity by type of educational work

№	The name of the discipline section	Activities (in hours)				
		L	LW	PC	SIW	total
1	Introduction to the subject. Physiology of excitable tissues	3	4	5	6	7
1	General and specific neurophysiology.	4		12	7	23
2	Autonomic nervous system	6		12	7	25
3	Physiology of the endocrine system	2		6	8	16
4	Physiology of the blood system	2		9	7	18
5	Physiology of the cardiovascular system	4		19	7	30
6	Respiratory physiology	4		10	5	19
7	Digestive physiology	8		16	5	29
8	Physiology of metabolism and energy	2		6	5	13
9	Physiology of nutrition and thermoregulation	2		6	6	14

10	Physiology of the excretory system	4	6	5	15
11	Analyzer Physiology	8	14	5	27
12	Physiology of higher nervous activity (HNA)	8	10	5	23
Total:		54	126	72	252

5.3. Thematic plan of lectures

№ section	Lecture topics	Number of hours per semester	
		III	IV
1	Introduction to Physiology. Physiology of excitable tissues. Bioelectric phenomena in tissues.	2	
	Nerve fibers. Myoneural synapse. Muscle physiology. The mechanism of muscle contraction. Indicators of physical activity of muscles (strength, work and muscle fatigue).	2	
2	General physiology of the central nervous system. Neuron, reflex, reflex arc. Excitation and inhibition in the central nervous system.	2	
	Particular physiology of the central nervous system. The role of various parts of the central nervous system in the regulation of muscle tone and phase movements.	2	
	Physiology of the autonomic (autonomic) nervous system.	2	
3	Physiology of the endocrine glands. Hypothalamic-pituitary system.	2	
4	Physiology of the blood system.	2	
5	Physiology of the cardiovascular system. Clinical and physiological methods of heart research.	2	
	Hemodynamics. Regulation of systemic circulation.	2	
Total for the III semester:		18	
6	Respiration physiology. Essence and meaning. External respiration, tidal volumes. Inhalation and exhalation mechanisms. Pleural cavity.		2
	Transport of gases by blood, alveolar-capillary barrier. Respiration regulation. Features of breathing in various conditions.		2
7	Physiology of digestion, essence and significance. The role of I.P. Pavlova in the study of digestion. Digestive and non-digestive functions.		2
	Digestion in the mouth and stomach. The composition of saliva, gastric juice. The role of HCl in digestion.		2
	The mechanism of food evacuation from the stomach. Digestion in the duodenum. The role of pancreatic juice and bile in digestion.		2
	Digestion in the large and small intestines. Strip and parietal digestion (Ugolev). The role of the microflora of the large intestine. Gastrointestinal absorption.		2
8	Physiology of metabolism and energy. Plastic and energy value of proteins, fats, carbohydrates. Introductory salt exchange. Regulation.		2
9	Physiology of rational nutrition. Diet requirements. Thermoregulation (physical, chemical).		2
10	Physiology of the excretory system. Renal, extrarenal routes of excretion. Nephron. Mechanisms of urine formation: glomerular filtration.		2
	Mechanisms of urine formation: tubular reabsorption and secretion. Regulation of		2

	kidney function.		
11	Physiology synthesis of analyzer systems. Pavlov's doctrine about analyzers. General properties of analyzers. Receptors, their classification.		2
	SAS. Physiology of tactile, temperature, olfactory, motor and gustatory analyzers. Pain analyzer, pain classification. Nociceptors are their types, the antinociceptive system of the body.		2
	Visual analyzer. Optical system of the eye. Anomaly of refractions, their correction. Retinal physiology, photoreceptors. Theory of color-sensations.		2
	Auditory and vestibular analyzers. The structure of the auditory analyzer. Sound perception mechanism. Visceral analyzer concept.		2
12	Higher nervous activity (HNA). Physiology of the cerebral cortex. Electroencephalography (EEG), clinical significance of cortical rhythms. The role of I.P. Pavlova in the study of HNA.		2
	HNA. Methods and rules for the development of conditioned reflexes (Pavlov). Temporary connection, mechanisms of education. The architectonics of the behavioral act according to Anokhin.		2
	HNA. Cortical inhibition, its types. Types of HNA according to Hippocrates and Pavlov. Sleep, types, phases and mechanisms of sleep. Dreams.		2
	Features of HNA in humans. Teaching about I and II signaling systems according to Pavlov. Functional asymmetry of the cerebral hemispheres.		2
Total for the IV semester:			30
TOTAL			48

5.4. Thematic plan of practical lessons

№ section	Name for practical sessions topics	Forms of control		Number of hours. in the semester	
		current**	midterm*	III	IV
1	PL1. Introductory lesson. Excitable tissues, parameters of excitability. Experiments by Galvani and Matteuchi.	T, PS		3	
	The laws of irritation and excitement conduction. Myoneuronal synapse.	T, PS, Pr		3	
	Muscle physiology: types of muscle contraction, tetanus. Dynamometry in humans.	T, PS, Pr		3	
	Final lesson: "Physiology of excitable tissues."	T, PS, Pr	T,C	3	
2	Reflex arc analysis. Determination of the reflex time according to Türk. Basic properties of nerve centers. Inhibition in the central nervous system. Experiments of Sechenov and Golts.	T, PS, Pr		3	
	Spinal cord physiology, spinal shock, tendon reflexes in humans. Tonic reflexes. Tests for the detection of static and dynamic ataxia.	T, PS, Pr		3	
	Physiology of the cerebellum, striopal and limbic systems.	T, PS, Pr		3	
	The autonomic nervous system. Vegetative reflexes in humans.	T, PS, Pr		3	
3	Human endocrine system. Effect of adrenaline on the pupil and isolated heart of a frog. Simol's iodine reaction.	T, PS, Pr		3	

	Final lesson: "General and specific neurophysiology. The autonomic nervous system. " Neurohumoral regulation of functions"		T, PS	3	
4	Clinical and physiological methods of blood tests, determination of hemoglobin, ESR, counting of formed elements	T, PS, Pr		3	
	Determination of blood group, Rh factor, clotting time	T, PS, Pr		3	
	Final lesson: "Physiology of the blood system"		T,C	3	
5	Physiology of the myocardium. Features of the heart muscle. Heart Automation, Stannius Experience. Clinical and physiological methods for examining the heart: listening to tones, determining the boundaries, ECG analysis.	T, PS, Pr		3	
	Regulation of heart activity: reflexes, the influence of hormones and electrolytes.	T, PS, Pr		3	
	Final lesson: "Physiology of the heart" (theoretical analysis).		T,C	3	
	Final lesson: "Physiology of the heart" (research methods).		T,C, Pr	3	
	Hemodynamics. Blood pressure measurement methods	T, PS, Pr		3	
	Total for the III semester:			54	
	Regulation of hemodynamics ... Pulse analysis, sphygmography.	T, PS, Pr			2
	Factors affecting the value of blood pressure. The effect of physical activity on heart rate and blood pressure in a volunteer.	T, PS, Pr			2
	Final lesson: "Physiology of the vascular system."		T,C		2
6	Physiology of external respiration. Respiratory volumes, spirometry.	T, PS, Pr			2
	Transport of gases by blood, oximetry. Calculation of the partial pressure of gases. Pulse oximetry.	T, PS, Pr			2
	Respiration regulation. Breath holding test (Shtange and Gencha). The effect of physical activity (squatting) on a person's breathing.	T, PS, Pr			2
	Final lesson: "Respiratory physiology".		T,C		2
7	Physiology of digestion. Experimental and clinical methods for studying the physiology of digestion. Demonstration of various fistulas, gastric and duodenal probes.	T, PS, Pr			2
	Digestion in the mouth and stomach. Determination of the digestive power of gastric juice in various conditions. Masticatiography.	T, PS, Pr			2

	Analysis of Pavlov's classic experiments: "Sham feeding", the experiment of an isolated ventricle.	T, PS, Pr		2
	Pavlovian curves of gastric secretion for various nutrients.	T, PS, Pr		2
	Duodenal intubation.	T, PS, Pr		2
	Analysis of endoscopic methods of patient examination: esophagoscopy, gastroscopy, duodenoscopy, colonoscopy, sigmoidoscopy.	T, PS, Pr		2
	Observation of intestinal automation and the movement of the cilia of the esophagus in the frog.	T, PS, Pr		2
	Final lesson: "Physiology of digestion."		T,C	2
8	Physiology of metabolism and energy. Calculation of basal metabolic rate according to weight, height and age.	T, PS, Pr		2
	Calculation of the percentage of deviation of the patient's basal metabolic rate from the proper one. Calculation of SDTP. Calculation of the total (gross exchange).	T, PS, Pr		2
9	Final lesson: "Physiology of metabolism and energy"	T, PS, Pr		2
	Physiology of nutrition. Drawing up a daily diet for representatives of various professional groups.	T, PS, Pr		2
	Physiology of thermoregulation. Analysis of the temperature map of the human body surface, daily temperature fluctuations. Measurement of the patient's temperature.	T, PS, Pr		2
	Final lesson: "Physiology of nutrition and thermoregulation."		T, PS	2
10	Determination of the specific gravity of urine (urometry). Extrarenal route of excretion (study of sweat glands according to Snyakin).	T, PS, Pr		2
	Calculation of the glomerular filtration rate (Clearance). Acquaintance with the principle of the "artificial kidney" apparatus.	T, PS		2
	Final lesson: "Physiology of the excretory system."		T, PS	2
11	SAS. Study of taste (density measurement), study of smell (olfactometry), study of tactile sensitivity (esthesiometry).	T, PS, Pr		2
	Aristotle's experience. Weber-Figner law. Analysis of the physiology of pain and pain relief.	T, PS, Pr		2

	Determination of visual acuity, determination of the field of view (perimetry).	T, PS, Pr		2
	The Marriott experience. Study of the pupillary reflex. Determination of the patient's color perception according to Rabkin's tables.	T, PS, Pr		2
	Physiology of the auditory and vestibular analyzer. Determination of hearing acuity. Comparison of air and bone conduction.	T, PS, Pr		2
	Physiology of auditory and vestibular analyzers. Adaptation of the auditory analyzer. Features of binaural hearing.	T, PS, Pr		2
	Final lesson: "Physiology of analyzers".	T, PS, Pr	T, PS	2
12	HNA. Physiology of the cortex. Electroencephalography (EEG). Development of a conditioned blinking reflex in humans.	T, PS, Pr		2
	Study of the functional system of the behavioral act according to Anokhin. Study of short-term visual and auditory memory in students.	T, PS, Pr		2
	Determination of the type of HNA (Isaac test). Determination of the type of HNA of a person by the method of grouping words. Test to determine the dominant hemisphere of the brain.	T, PS, Pr		2 2
	Final lesson: "Physiology of higher nervous activity."		T, PS	2
Total for the IV semester:				72
TOTAL:				126

* Forms of current monitoring of progress (with abbreviations): T - testing, Pr - assessment of the development of practical skills (abilities), PS - solving situational problems, P - writing and defending an abstract, C - interview on control questions and others.

5.5. Lab lessons are not included in the curriculum

Some laboratory works are not performed at the department. In practical classes, research is carried out on some physiological indicators of a person, reflexes on volunteers, experiments and experiments on frogs.

5.6 . Educational and methodological support for independent work in the discipline

5.6.1. Student's independent work in the discipline

No	Discipline section	Name of works	Labor intensity (hour)	Control forms
1		3	4	5
1	Normal physiology as a science. Organism	Providing activities for frogs; preparation of oral reports on dynamometry, preparation for practical exercises + filling out the main terms of the section in the workbook; study of educational and scientific literature; preparation	7	

	zation levels of the human body. The unity of the body with the external environment.	for control questions on the topic of a practical lesson, work with electronic educational resources located in the DSP - DSMU (LMS.DGMU.RU)		P
2	Integrative functions of the central nervous system. Principles of coordinating activity of the central nervous system. The plasticity of the cerebral cortex. Functional asymmetry of the cerebral hemispheres in humans.	Preparation for practical exercises - filling out the main terms of the section in the workbook; study of educational and scientific literature; preparation of reports with a presentation on tendon reflexes; preparation for test questions on the topic of a practical lesson, work with electronic educational resources posted in the DSP - DSMU (LMS.DGMU.RU).	7	P,T,PS
3	The neuroendocrine system of the body. The role of neuropeptides in the regulation of physiological functions.	Preparation for practical exercises - filling out the main terms of the section in the workbook; study of educational and scientific literature; preparation of reports with a presentation on endemic goiter, diabetes mellitus, adrenal pathology; preparation for control questions on the topic of a practical lesson, work with electronic educational resources posted in the DSP - DSMU (LMS.DGMU.RU).	8	P,T,PS filling out a questionnaire to identify the risk of diabetes
4	The internal environment of the body and homeostasis. Mechanisms of hemostase and febrinolysis.	Preparation for practical exercises on the determination of blood groups using tsoliclones, solving situational problems in determining the blood group, filling out the main terms of the section in the workbook; preparation for control questions on the topic of a practical lesson, work with electronic educational resources posted in the DSP - ДГМУ (LMS.DGMU.RU)	7	P,T,PS
5	Clinical and physiological methods of heart research. Reflexes of the heart. Intra- and extracardiac mechanisms of CVS regulation.	Independent performance of all procedures for registration of an ECG by a student. Preparation for practical exercises - filling out the main terms of the section in the workbook; study of educational and scientific literature; preparation for test questions on the topic of a practical lesson, work with electronic educational resources posted in the DSP - DSMU (LMS.DGMU.RU)	7	P,T,PS

6	Breathing, gas exchange in the lungs and tissues, the composition of atmospheric air, regulation of breathing, mountain and decompression sickness.	Preparation for practical exercises - filling out the main terms of the section in the workbook; study of educational and scientific literature; solving the situation problems, given in practical classes; spirometry report; preparation for test questions on the topic of a practical lesson, work with electronic educational resources posted in the DSP - DSMU (LMS.DGMU.RU).	5	P,T,PS (familiarization with the spirometry, checking the protocol, checking the terminology of the section)
7	The role of Pavlov in the study of the physiology of digestion, Neurohumoral regulation of the alimentary function.	Abstract messages on the work of Pavlov on digestion. Preparation for practical lessons - filling out the main terms of the section in the workbook; studying educational and scientific literature; preparation for test questions on the topic of a practical lesson, work with electronic educational resources posted in the DSP - DSMU (LMS.DGMU.RU)	5	P,T,PS
8	Metabolism and energy, basal metabolic rate calculation, pre-professional groups, the basics of adequate nutrition.	Preparation for practical exercises - filling out the main terms of the section in the workbook; solving situational tasks on the topic, calculating O ₂ according to tables from family members at home; preparation for test questions on the topic of a practical lesson, work with electronic educational resources located in the DSP - DSMU (LMS.DGMU.RU).	5	P,T,PS (protocol check, section terminology check)
9	The principles of the organization of rational nutrition. Diet. The constancy of the temperature of the internal environment of the body - the conditions of normal metabolism.	preparation for practical exercises - filling out the basic terms of the section in the workbook; preparation of abstracts on the issues of proper nutrition, drawing up a diet at home; preparation for control questions on the topic of a practical lesson, work with electronic educational resources located in the DSP - DSMU (LMS.DGMU.RU).	6	P,T,PS (dietary requirements, protocol check, section terminology check)
10	Renal and extrarenal mechanisms for maintaining the constancy of the internal	preparation for practical exercises - filling out the basic terms of the section in the workbook; reference messages on methods for determining various indicators of kidney function: clearance, by PAH, concentration index; preparation for control questions on the topic of a practical lesson, work with electronic educational resources located in	5	P,T,PS (familiarization with hemodialysis,

	body. The principle of operation of the apparatus "Artificial kidney".	the DSP - DSMU (LMS.DGMU.RU)		with an artificial kidney, protocol check, section terminology check)
11	The concept of an analyzer from the position of the teachings of I.P. Pavlova. Receptor and generator potentials. Principles of coding information signals in analyzers.	preparation for practical exercises - filling out the basic terms of the section in the workbook; reference messages on the topics: "Refraction anomalies and their correction", "Theory of color perception"; preparation for test questions on the topic of a practical lesson, work with electronic educational resources posted in the DSP - DSMU (LMS.DGMU.RU)	6	P,T,PS (familiarization with the Forster perimeter device, protocol check, section terminology check)
12	HNA. types of human HNA. Differences between human HNA and animals. Memory, memory types.	preparation for practical exercises - filling out the main terms of the section in the workbook; Determination of the types of HNA according to the Eysenck test at home with family members; preparation for test questions on the topic of a practical lesson, work with electronic educational resources posted in the DSP - DSMU (LMS.DGMU.RU).	6	P,T,PS (protocol check, section terminology check)
13	Exam preparation	Repetition and consolidation of the studied material (work with lecture material, educational literature); formulation of questions; pre-examination individual and group consultations with a teacher.	24	C
14	Taking an exam		12	
TOTAL:			78	

5.6.2. Subject of abstract works

№	Section	Competencies / Achievement Indicator	Topic
1	1	GPC-5/AI-1	Nobel laureates in physiology, their contribution to science
2	1	GPC-5/AI-1	Physiology of the cell. The cell membrane, its structure and function. KINDS of transport across membranes. Ion channel classification.
3	1	GPC-5/AI-1	Synapse concept. Classification of synapses and mediators. Nature of EPSP and TPSP
4	1	GPC-5/AI-1	Muscle physiology. Motor units. Electromyography.

5	2	GPC-5/AI-1	The concept of the nerve center in a broad and narrow sense. Physiological properties of nerve centers.
6	2	GPC-5/AI-1	The value of inhibition in the central nervous system. History of the discovery of braking. Modern interpretation of the braking process.
7	2	GPC-5/AI-1	The autonomic nervous system and its functions. The main types of mediators and receptors. Vegetative reflexes in humans and their clinical significance.
8	3	GPC-5/AI-1	Endocrine system. Classification of biologically active substances. Stress, mechanisms. The role of Hans Selye in the development of the doctrine of stress.
9	4	GPC-5/AI-1	Diversity of blood group systems, their characteristics. Basic and additional agglutinogens.
10	4	GPC-5/AI-1	Determination of blood groups and Rh factor using tsoliclones.
11	4	GPC-5/AI-1	A functional system that maintains the liquid state of the blood (RASK - regulation of the aggregate state of blood).

5.6.3. Methodical instructions for students on mastering the discipline

(Appendix No. 3, teaching aids to practical classes for students in 2 parts

Part №1: Physiology of excitable tissues. General and private neurophysiology, physiology of the endocrine system. physiology of the blood system. Physiology of the cardiovascular system.

Part №2: Respiration physiology. Physiology of digestion. Physiology of metabolism and energy. Physiology of nutrition and thermoregulation. Excretion physiology. Physiology of synthesis-analyzer systems. Physiology of higher nervous activity.

Authors of teaching aids: the staff of the department.

6. Evaluation tools for current, midterm control of progress and intermediate certification based on the results of mastering the discipline

6.1.1. Current and midterm control of progress

6.1.2. The list of competencies indicating the stages of formation in the process of mastering the working program of the discipline

Competency Code / Achievement Indicator			
GPC-5/AI-1	способность к оценке морфофункциональных, физиологических состояний и патологических процессов в организме человека для решения профессиональных задач.		
<i>№ section</i>	<i>Controlled competencies / Indicator of achievements</i>	<i>The name of the discipline section</i>	<i>Evaluation tools</i>
<i>Current (CC) and midterm (MTC) control</i>			
1	GPC-5/AI-1	Normal physiology as a science. The levels of organization of the human body. The unity of the organism with the external environment.	CC: Т, Пp, ЗС PK: C, Т, ЗС

2	GPC-5/AI-1	Integrative functions of the central nervous system. Principles of coordination activity of the central nervous system. The plasticity of the cerebral cortex. Functional asymmetry of the cerebral hemispheres in humans.	CC: T, Pr,PS MTC: C, T, PS
3	GPC-5/AI-1	The neuroendocrine system of the body. The role of neuropept AIs in the regulation of physiological functions.	CC: T, PrPS MTC: C, T, PS
4	GPC-5/AI-1	The internal environment of the body and homeostasis. Mechanisms of hemostasis and febrinolysis.	CC: T, PrPS MTC: C, T, PS
5	GPC-5/AI-1	Clinical and physiological methods of heart research. Reflexes of the heart. Intra- and extracardiac mechanisms of CVS regulation.	CC: T, PrPS MTC: C, T, PS
6	GPC-5/AI-1	Breathing, gas exchange in lungs and tissues, composition of atmospheric air, regulation of breathing, mountain and decompression sickness.	CC: T, PrPS MTC: C, T, PS
7	GPC-5/AI-1	The role of Pavlov in the study of the physiology of digestion. Neurohumoral regulation of the digestive function.	CC: T, PrPS MTC: C, T, PS
8	GPC-5/AI-1	Metabolism and energy, basal metabolic rate calculation, professional groups, the basics of adequate nutrition.	CC: T, PrPS MTC: C, T, PS
9	GPC-5/AI-1	The principles of organizing a balanced diet. Diet. The constancy of the temperature of the internal environment to the body is the condition of normal metabolism.	CC: T, PrPS MTC: C, T, PS
10	GPC-5/AI-1	Renal and extrarenal mechanisms for maintaining the constancy of the internal organism. The principle of operation of the apparatus "Artificial kidney".	CC: T, PrPS MTC: C, T, PS
11	GPC-5/AI-1	The concept of the analyzer from the position of the teachings of I.P. Pavlova. Receptor and generator potentials. Principles of coding information signals in analyzers.	CC: T, PrPS MTC: C, T, PS
12	GPC-5/AI-1	GNI. types of human GNI. Differences between human GNI and animals. Memory, in AI memory.	CC: T, PrPS MTC: C, T, PS
GPC-5/AI-1		Normal Physiology Exam	Normal Physiology Exam

6.1.2. Examples of assessment tools for current and midterm monitoring of progress

INTERVIEWING ON CONTROL ISSUES AND SITUATION TASKS (GPC-5/AI-1)

Section №1. General Physiology of Excitable Tissues: Test Questions (GPC-5 / AI-1)

1. What is excitability, what tissues are excitable? General properties of excitability: threshold of excitability, rheobase, useful time, chronaxia, lability.
2. Refractoriness and its phases.
3. The nature of the membrane potential (resting potential). Selective permeability of the cell membrane in the emergence of membrane potential.
4. The nature of excitement, phases of the action potential.
5. The structure and function of the neuromuscular synapse.

Section № 4. Physiology of the blood system: *situational tasks* (GPC-5/AI-1)

1. A woman (35 years old) developed complaints of acute abdominal pain. The pains are constant, aggravated by movement and walking. On palpation, local tenderness is noted in the right iliac region. An increase in body temperature up to 38 ° C was noted. In blood tests: Hb - 110 g / l; leukocytes - 14,000 in 1 µl; ESR - 14 mm / h. What blood changes do the patient have? What is a shift of the leukocyte formula to the left?
2. A blood test was taken from an athlete participating in a marathon race in Death Valley (USA) at an air temperature of 50 C, after 1 hour of running. What homeostatic blood parameters could change and why?
3. In situations accompanied by an increase in the activity of the sympathetic division of the autonomic nervous system, for example, in case of danger, pain, emotional stress (stress), blood clotting increases. What is the biological meaning of increasing blood clotting in stressful situations? What are the negative consequences of increased clotting during emotional stress?

Terminology (glossary) on the topic or Section of the discipline (see the training manual for practical exercises)

Criteria for assessing current and midterm monitoring of progress (interview on control questions, including a glossary and situational tasks)

"Unsatisfactory":

Knowledge: the student does not know the material or has not mastered a significant part of the program material within the limits of the questions posed, is not able to independently highlight the main provisions in the studied material of the discipline, does not know the terminology.

Skills: the student does not know how to apply the existing knowledge in the interpretation of physiological parameters, specific situations and solving situational problems.

«Satisfactory»

Knowledge the student has mastered the main content of the discipline's material, but has gaps: knowledge that is unsystematized by the topic or sections of the discipline. The material expresses fragmentarily, inconsistently, confuses certain terms.

Skills: the student has difficulty in presenting material on the topic or Section of the discipline: presents inconsistently and not systematized. Difficulties in applying the knowledge necessary to solve individual situational tasks, when explaining specific concepts and situations.

«Good»

Knowledge the student is able to independently highlight the main provisions in the studied material. Shows knowledge of the program material on the topic or Section of the discipline. Gives the correct answer, but makes minor mistakes and shortcomings when reproducing the studied material, definitions of concepts, inaccuracies in the use of terminology.

Skills: the student is able to use the acquired knowledge when interpreting physiological parameters in a changed situation, observes the basic rules of the culture of oral speech, correctly uses the terminology.

«Excellent»

Knowledge the student independently identifies the main provisions in the studied material and is able to give a full description of the main ideas of the studied material of the discipline. Knows a glossary on a topic or Section of a discipline.

Skills: the student is able to compose a complete and correct answer based on the studied material, highlight the main provisions, independently confirm the answer when solving situational problems, independently and reasonably make analysis, generalizations and conclusions. Establish interdisciplinary (based on previously acquired knowledge) and intra-subject connections, creatively apply the acquired knowledge to solve physiological problems. Consistently, clear, is connected, justified and accurately presents educational material: gives an answer in a logical sequence using the accepted terminology, draws its own conclusions, formulates an exact definition and interpretation of basic concepts and rules. Is able to independently use visual aids, reference materials, a textbook, additional literature, primary sources, physiological devices and medical instruments on a topic or Section of a discipline.

PRACTICAL SKILLS

Section №5. Physiology of the cardiovascular system

Controlled competency codes GPC-5/AI-1 («possess »).

1. Clinical and physiological methods for the study of CVS.

1.1.Pulse study in humans.

1.2.Measurement of blood pressure in humans.

Criteria for assessing current and midterm monitoring of progress

«Unsatisfactory»: the student does not have practical skills in the study of physiological functions on this topic or Section of physiology.

«Satisfactory»: the student possesses the basic practical skills on the topic or Section of the discipline, but performs them only with outside help, makes mistakes and inaccuracies when doing it on his own, using the terminology.

« Good »: the student has sufficient skill in working with the instrumentation, to reproduce the experiments on a living object, but he does it using the manual for practical exercises.

«Excellent»: the student possesses the skill of demonstrating a physiological experiment and methods of clinical research of human physiological functions, shows deep and complete proficiency in the topic or Section of the discipline.

TESTING

EXAMPLE

CURRENT PERFORMANCE CONTROL – TESTS

Supervised Competency Codes GPC-5

Section №4. Physiology of the blood system

1. To determine the erythrocyte sedimentation rate, use a reagent:

! 0.5% sodium chloride AIa solution

! 3% acetic acid solution

! 1.7% hydrochloric acid solution

+! 5% sodium citrate solution

1. To determine hemoglobin by Sali's method, a reagent is used:

! 3% acetic acid solution

! 3.5% sodium chloride AIa solution

! 3.7% sodium citrate solution

+! 0.1N hydrochloric acid solution

1. To count leukocytes in the counting chamber of Goryaev, blood is diluted:

! isotonic sodium chloride AIa solution

! 0.15% hydrochloric acid solution

! 3.5% sodium citrate solution

+! 5% acetic acid solution with methylene blue

1. Determination of the amount of hemoglobin in the blood is carried out using:

! Goryaev cameras

! celloscopic

! Panchenkov's device

+! photoelectric colorimeter, hemometer Sali

Section 12. Physiology of HNA (GPC-5/AI-1: «знать»)

1. The idea of the reflex nature of the activity of the higher parts of the brain was first put forward by:
 - ! I.P. Pavlov
 - ! P.C. Anokhin
 - +! I.M. Sechenov
6. In the functional system of behavior (according to P.K. Anokhin), severe toothache forms:
 - ! orientation reflex
 - ! decision-making
 - ! result acceptor
 - +! dominant motivation
7. In the functional system of behavior (according to P.K. Anokhin), after afferent synthesis, the stage begins:
 - ! sustainable performance
 - ! anxiety
 - ! paradoxical
 - +! decision making
 - **Criteria for assessing midterm performance control (testing):**
 - «excellent»: 91-100%
 - «good»: 76-90%
 - «satisfactory»: 61-75%
 - «unsatisfactory»: < 61%

6.2. Interim certification based on the results of mastering the discipline

6.2.1. Interim certification forms – exam IV semester: testing and oral interview or oral interview

6.2.2. Interim certification procedure in 1 and / or 2 stages:

face-to-face: testing and interview or interview;

in On-line: testing and interview or interview.


6.2.3. Examples of questions to prepare for the exam (interview) in normal physiology for second-year students of the medical faculty

Controlled competency codes: GPC-5

1. What is excitability, what tissues are excitable? General properties of excitability: threshold of excitability, rheobase, useful time, chronaxia, lability.
2. The nature of the membrane potential (resting potential). Selective permeability of the cell membrane in the emergence of membrane potential.
3. Features of hormonal regulation of functions. Types and mechanisms of action of hormones. Classification of hormones by chemical structure.
4. Pituitary gland. The role of its hormones in the regulation of growth and development of the body.
5. Buffer systems of blood, their role in maintaining blood pH.
6. Factors that make up the elastic traction of the lung (ETL).
7. Intrathoracic negative pressure, role in the breathing process,

8. Glomerular filtration. Primary urine composition.
9. Processes of reabsorption and secretion in the tubular apparatus of the nephron. Formation of final urine. Quantity and composition.
10. The doctrine of I.P. Pavlov on conditioned reflexes. General characteristics and properties of conditioned reflexes. Educational rules and methodology for developing conditional reflexes. Classification of conditioned reflexes.
11. The mechanism of formation of a conditioned reflex. Modern ideas about the mechanism of closure of a temporary connection. The role of the dominant in the mechanisms of closure of the time connection. Stages of the formation of a conditioned reflex. types of classical conditioned reflexes: food, defensive, motor, autonomic. Conditioned reflexes of the second and higher order.

Exam card examples

 MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION Federal State Budgetary Educational Institution of Higher Education "Dagestan State Medical University"
Examination card № in the discipline "Normal physiology" for students of the 2nd year of specialty, direction of training - "General Medicine »
<ol style="list-style-type: none"> 1. Excitability and excitable tissues. Power and timing parametersexcitability. 2. Hormones of the adrenal glands (cortex and medulla). 3. Factors that make up the elastic traction of the lung (ETL). Intrathoracic negative pressure, a role in the breathing process. 4. 4. Determination of the Türk reflex time in the spinal frog.
The card was prepared by Ph.D., Assoc. Nurmagomedova Kh.A. Approved at a meeting of the Department of Normal Physiology " " _____ 20_ , protocol " " _____" Head department, professor _____ Ragimov R.M.

6.2.5. The system for assessing the results of mastering the discipline, a description of the scales of assessment and grading

The grading system includes an exam

Assessment indicators	Grading scale			
	"Unsatisfactory" (baseline not reached)	«satisfactory" (basic level)	"Good" (intermediate level)	"Excellent" (high or advanced)
Competency Code / Achievement Indicator – GPC-5/AI-1				
To know	The student is not able to independently highlight the main provisions in the studied material of the discipline. Does not know the main content of the material of the discipline and terminology.	The student has mastered the main content of the discipline material, but has unsystematic knowledge about the main provisions in the studied material, confuses certain terms	The student is able to independently highlight the main points in the material studied. Knows the basic ideas of the training material, and the terminology.	The student shows a deep knowledge of the material, independently highlights the main provisions, shows a deep knowledge and understanding of physiological processes.
To be able to	The student does not know how to present the main provisions of the educational material.	The student is able to present the basic material of the discipline, but has difficulty in interpreting individual physiological processes and solving situational problems.	The student is able to independently present the main material of the textbook, use knowledge to generalize the educational material and interpret physiological constants when solving situational problems.	The student is able to logically sequentially and in detail set out all the material, independently draw a conclusion about the physiological processes occurring in the human body, freely solve situational problems.
To possess	The student does not own the skill.	The student possesses the basic material and skills, is able to perform physiological experiments and clinical research methods, but with the teacher's suggestion.	The student possesses knowledge of all the studied software material, and basic skills, is able to perform physiological experiments and clinical research methods, but admits insignificant inaccuracies during reproduction.	The student has a deep knowledge of the material, all the skills, independently and accurately performs physiological experiments and clinical research methods.

- **Criteria for assessing intermediate monitoring of progress (testing):**

- «excellent»: 85-100%
- «good»: 70-84%
- «satisfactory»: 50-69%
- «unsatisfactory»: < 50%

7. EDUCATIONAL-METHODOLOGICAL AND INFORMATION SUPPORT OF THE DISCIPLINE

7.1. Main literature

Printed editions:

№	Editions	Number of copies in the library
1	Normal physiology: textbook / under. ed. VM Smirnov. -3rd ed., Revised. and add. - Moscow: IC "Academy" - 2010. / ISBN 978-5-7695-8029-1	200
3	Normal physiology.: textbook / under. ed. acad. K.V. Sudakova M.: GEOTAR - Media, 2015. - ISBN 5-8948-294-1	500

No.	Editions	Number of copies in the library
1.	Textbook on normal physiology: the nervous system, part I in English, - Makhachkala IPC DSMU. 2017. -231 p. (Medical Formation)	30
2.	A textbook on normal physiology: the nervous system, part II in English, - Makhachkala IPC DSMU. 2017 .-- 267 p. (Medical Formation)	30
3.	A textbook on normal physiology: the nervous system, part III in English, - Makhachkala IPC DSMU. 2017 .-- 267 p. (Medical Formation)	100
4.	A textbook on normal physiology: the nervous system, part IV in English, - Makhachkala IPC DSMU. 2017 - 267 p. (Medical Formation)	100

Electronic publications::

1	Normal physiology [Electronic resource]: textbook / ed. L.Z.Telya, N.A. Agadzhanian - Moscow: Litterra, 2015. - http://www.studmedlib.ru/book/ISBN9785423501679.html
2	Normal physiology [Electronic resource]: textbook / ed. B.LTKachenko. - 3rd ed., Rev. and add. - Moscow: GEOTAR-Media,2016. - http://www.studmedlib.ru/book/ISBN9785970436646.html

7.2. Additional literature

Printed editions:

№	Editions	Number of copies in the library or department
1	Atlas of Physiology / A.G. Kamkin, M.S. Kiseleva, in 2 volumes. Volume 1. - Moscow: GEOTAR-Media, 2012 .-- 402 p. / ISBN 978-5-9704-1596-2	15
2	Atlas of Physiology / A.G. Kamkin, M.S. Kiseleva, in 2 volumes. Volume 2. - Moscow: GEOTAR-Media, 2012 .-- 474 p. / ISBN 978-5-9704-1594-8.	15
3	Human physiology. Atlas of dynamic schemes: tutorial / ed. Sudakova K.V., -22nd ed., Revised. and add. - Moscow: GEOTAR-Media, 2015 .-- 416 p. /	1

	ISBN 978-5-9704-3234-1	
4	Study guide for practical exercises for students in two parts. Part 1. / ed. prof. T.S. SulakvelAize - CPC DSMU. - Makhachkala. - 2018. -- 96 p.	5
5	Study guide for practical exercises for students in two parts. Part 2. / ed. prof. T.S. SulakvelAize - CPC DSMU. - Makhachkala. - 2018. -- 104 p.	5
6	A guide to practical exercises in normal physiology: a textbook for HPE students / ed. CM. Budylnina, V.M. Smirnov. - M.: Academy, 2011. -- 439 p. / ISBN 978-5-7695-8029-1	395
7	Physiology. Textbook for dental faculties med. universities. Ed. V.M. Smirnova, V.G. Zalova, M.A. Medvedev. 3rd edition. Moscow: MIA, 2020./ ISBN 978-5-9986-9408-9	150
8	Textbook on Medical Physiology: Nervous System Part IV - Makhachkala IPC DSMU. 2017-235p.	6

Electronic publications:

№	Editions
1	2
1	Normal physiology [Electronic resource]: textbook / V.P. Degtyarev, N.D. Sorokin - M.: GEOTAR-Media, 2016. - http://www.studmedlib.ru/book/ISBN9785970435472.html
2	Normal physiology [Electronic resource]: textbook / ed. K.V. Sudakov. - Moscow: GEOTAR-Media, 2015. - http://www.studmedlib.ru/book/ISBN9785970435281.html
3	Human physiology: Atlas of dynamic schemes [Electronic resource]: textbook / K.V. Sudakov, V.V. Andrianov, Yu.E. Vagin, I.I. Kiselev. - 2nd ed., Rev. and add. - Moscow: GEOTAR-Media, 2015. - http://www.studmedlib.ru/book/ISBN9785970432341.html
4	EBS Medical University (Student Consultant) http://www.studmedlib.ru - access mode: by login and password.

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

№	Resource name
1	Electronic library: library of dissertations: site / Russian State Library. - Moscow: RSL, 2003. - URL: http://diss.rsl.ru/?lang=ru - Text: electronic.
2	Government of the Russian Federation: official site. - Moscow. - Updated within 24 hours. URL: http://government.ru . - Text: electronic.

7.4 Information Technology

When studying the discipline, a general package of documents is used, Internet materials, which provide ample opportunities for improving university training in normal physiology in order to master the skills of educational activities. The standard features of most programs are the implementation of the yes principle of visibility in teaching; their use enables students to use various methods to solve an educational problem.

Teaching methods using information technology.

The methods of teaching using information technologies used in the classroom in the discipline "Normal physiology" include:

- computer testing;
- demonstration of multimedia materials, including in AI films, audio-in-AI-lectures;
- a list of search engines (site moodle.dgmu.ru)
- a list of encyclopedic sites;
- list of software:

1. Operating system Microsoft Windows 7 Professional.
2. Operating system Microsoft Windows 10 Pro (on new computers).

3. Packages of application programs:

Microsoft Office Professional Plus 2007 Microsoft Office Professional Plus 2010

Microsoft Office Professional Plus 2013

Microsoft Office Standard 2013

Microsoft Office Standard 2016 consisting of: Microsoft Word 2007 (2010, 2013, 2016), Microsoft Excel 2007 (2010, 2013, 2016), Microsoft Power Point 2007 (2010, 2013, 2016).

List of information reference systems:

1. Electronic information and educational environment (DSP) DSMU. URL: <http://eos-dgmu.ru>; <https://eos-dgmu.ru/course/view.php?id=25>

2. Student Advisor: Electronic Library System. URL: <http://www.studentlibrary.ru>

3. Physician Consultant: Electronic Library System. URL: <http://www.rosmedlib.ru>

4. Federal Electronic Medical Library (ФЭМБ). URL: <http://feml/scsml.rssi.ru>

5. Scientific electronic library eLibrary. URL: <https://www.elibrary.ru/defaultx.asp>

6. Medical reference information system. <http://www.medinfo.ru/>

8. MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE

№	Type of premises with a number (classroom, laboratory, computer class, etc.) indicating the address (location) of the building, clinical base, structure, premises, area of the premises, its purpose (for independent work, practical training, current control, intermediate certification, e-learning, lectures, etc.)	equipment identification
1	<p>Halls No. 2 and No. 3 on the street. A. Aliyev 1, Biokorpus and hall. morphobody - for lectures.</p> <p>For practical exercises: study rooms (auditoriums) of the department (2nd 3rd floor of the bio-building, A. Aliyev str. 1.):</p> <p>No. 3 (area 25m², seats - 20, study tables - 10, marker board - 1 pc., Hanger - 1 pc.);</p> <p>No. 68 (area 40m², seats - 27, study tables - 14, marker board - 1 pc., Hanger - 1 pc., Screen - 1 pc., Portrait - 2 pcs., Bookcase - 2 pcs., Screen - 1 PC.);</p> <p>No. 76 (area 23m², seats - 21, study tables - 11, marker board - 1 pc., Hanger - 1 pc., Washbasin - 1 pc., Bookcase - 1 pc.)</p> <p>No. 77 (area 16m², seats - 13, study tables - 7, marker board - 1 pc., Hanger - 1 pc., Washbasin - 1 pc.)</p> <p>No. 78 (area 16m², seats - 17, study tables - 9, marker board - 1 pc., Hanger - 1 pc., Washbasin - 1 pc., Hinged shelf - 1 pc.)</p> <p>No. 79 (area 17m², seats - 18, study tables - 8, marker board - 1 pc., Washbasin - 1 pc., Hinged shelf - 1 pc.)</p> <p>No. 81 (area 35m², seats - 22, study tables - 11, marker board - 1 pc., Washbasin - 1 pc., Cabinet - 2 pcs.)</p> <p>No. 97 (area 22m², seats - 19, study tables - 9, marker board - 1 pc., Washbasin - 1 pc.)</p> <p>No. 98 (area 35m², seats - 28, study tables - 11, marker board - 1 pc., Washbasin - 1 pc., Wardrobe - 1 pc., Portrait - 1 pc., Hanger - 2 pcs., Hanging shelf - 4 things.)</p> <p>Office of the head of department No. 80 (area - 22m², a set of cabinet furniture - 1 piece, roller blinds - 1 piece, chairs - 10 pieces, an armchair - 1 piece, a wardrobe - 2 pieces, a sofa - 1 piece, a washbasin - 1 PC.)</p> <p>- Room for training in valeology and IWS (3rd floor of the bio-building) No. 99 (area - 57m², medical couch - 1 piece, chairs - 24 pieces, study tables - 13, banners - 15 pieces);</p> <p>Educational laboratory - No. 82 (2nd floor of the bio-building, A. Aliyev st. 1) (area 18m², seats - 6, laboratory table - 1, computer table - 1 pc., work table - 2 pcs., sliding wardrobe pole A1 - 1 pc., wall clock - 1 pc., washbasin - 1 pc.) ...</p> <p>- Experimental laboratory - room number 100 (3rd floor of the bio-building, A. Aliyev st.</p>	<p>For lectures: laptop "ASUS" - 2 pcs., projector "ACER", "BENQ", "Overhead" projector -1.</p> <p>For administrative use:</p> <ol style="list-style-type: none"> 1. personal computers (without printers) - 3 pcs.; 2. Xerox "Canon FC-128" - 1 pc.; 3. laser printer HP LJ-1 - 1 pc.; 4. MFP "KYOCERA" - 1 pc.; 5. Scanner "GENIUS" - 1 pc.; 6. Refrigerator - 3 pcs. <p>For practical training and IWS:</p> <p>distiller - 1 pc. ;</p> <p>lake frogs for physiological experiments;</p> <p>Galvani tweezers - 6 pcs.;</p> <p>laboratory couch TKA-1;</p> <p>Goryaev's chamber - 8 pcs.;</p> <p>Panchenko's tripod - 10 pcs.,</p> <p>Sali's hemometer - 10 pcs.;</p> <p>meplangers for erythrocytes - 6 pcs., for leukocytes - 15 pcs;</p> <p>microscopes - 12 pcs. ;</p> <p>sets of sets of tsoliclones - 5 pcs. ;</p> <p>electrocardiographs (ECG): EK 12 T - 01 - 2 pcs.;</p> <p>EK 1T-1/3 (Axion) - 1 pc. ;</p> <p>water spirometer - 4 pcs. ;</p> <p>microprocessor spiograph SMP21 / 01 - 1 pc. ;</p> <p>pulse oximeter - 6 pcs.;</p> <p>fistulas - 10 pcs.;</p> <p>probes: gastric - 2 pcs., duodenal - 1 pc. ;</p>

<p>1) (area - 15 m², microtome - 1 piece, laboratory tables - 3 pieces, chair - 2 st.) Scientific laboratory (2nd floor of the bio-building, A. Aliyev st. 1) - room No. 4 (area - 11 m², medical couch - 1 pc., Cabinet - 3 pcs., Screen - 1 pc.) Assistant room - room No. 5 (2nd floors of the bio-building, A. Aliyev st. 1 (area 13m², seats - 5, study tables - 4, washbasin - 1 pc., Wardrobe - 2 pcs.) Associate Professor No. 84 (2nd floor of the bio-building, A. Aliyev st. 1). (area 18m², seating places - 8, work table - 3 pcs., washbasin - 1 pc., wardrobe - 1 pc., cupboard - 2 pcs.) Preparatorskaya No. 83 (2nd floor of the bio-building, A. Aliyev st. 1) (area 13m², washbasin - 2 pcs., Cabinet - 2 pcs.) Bathroom - room No. 6 (2nd floor of the bio-building, A. Aliyev st. 1) (area 3m², washstand - 1 pc.).*</p>	<p>floor scales - 2 pcs.; stadiometer - 2 pcs.; tonometers - 1) pcs.; phonendoscope - 6 pcs.; neurological hammer - 6 pcs.; dynamometers: wrist - 7 pcs. and the staff - 3 pieces; urometer - 5 pcs.; portable dialyzer for the device "Artificial kidney" - 4 pcs.; olfactometer - 2 pcs.; aesthesiometry compass - 5 pcs.; a set of solutions for conducting density measurement - 6; Sivtsev tables - 10 pcs.; Foster's perimeters - 4 pcs.; Rabkin's table - 2 pcs.; a set of tuning forks - 1 pc.; separate tuning forks - 6 pcs.; shield for developing a conditioned reflex in humans - 4 pcs.; laboratory glassware for practical exercises (test tubes, beakers, flasks, cylinders, test tube racks, pipette, cups, etc.); magnifying loupes - 2 pcs.</p>
--	--

9. STAFF SUPPORT OF THE DISCIPLINE. Information about the staffing required for the implementation of the educational process

№	Full name of a teacher	Условия привлечения (штатный, внутренний совместитель, внешний совместитель, по договору)	Занимаемая должность/ученая степень/ученое звание	Образование (какое образовательное учреждение окончил, год)	Уровень образования, наименование специальности по диплому, наименование присвоенной квалификации	Общий стаж работы	Стаж практической работы по профилю образовательной программы в профильных организациях с указанием периода работы и должности
1	2	3	4	5	6	7	8
1	Rahimov R.M.	staff	head of the department prof.,	higher, DMI	medical doctor	43	34/4
2	Nurmagomedova Kh.A	staff	d.m.s.	higher, DMI 1966	medical doctor	52	51
3	Bilalova R.R.,	staff	Head of Academic slave., Assoc. Ph.D.	higher DSMI 1967	medical doctor	55	52
4	Izmailova A.Kh	staff	Candidate of Medical Sciences, Associate Professor	higher DSMI 1971	dentist	52	52
5	Abdullaeva N.M.	internal alignment	Ph.D.,	higher DSU 2000	biologist, teacher of biology, chemistry	20	17
6	Garunova R.E.	staff	assistant professor	higher DSMI 1994	medical doctor	23	23

7	Suleimanova R.G.	staff	Ph.D., associate professor	higher DSMA 2002	medical doctor	19	19
8	Botasheva M.M	by agreement	Art. Rev.	Higher KCHSTU 2001	chemistry-biology teacher	20	20
9	Magomedova M.M.	internal alignment	Candidate of Medical Sciences, Acting As- soc. depart- ment	Higher DSPU 1972	teacher of biology and chem- istry	49	31
10	Alieva N.M.	internal alignment	Ph.D., assistant	Higher DSMA 2009	pharmacy	12	12
11	Ragimova R.I.	staff	assist.	Higher DSMA 2002	medical doctor	14	8

10. USE OF INNOVATIVE (ACTIVE AND INTERACTIVE) LEARNING METHODS

The active teaching methods used in the study of this discipline make up 10% of the volume of classroom studies.

№	Section name	Type, title of the topic of the lesson using forms of active and interactive teaching methods. Sections: 1,2,3,4,5,6,11,12.	Labor intensity (in hours)
1	Physiology of the endocrine system	Lecture: Hypothalamic-pituitary system (problem lecture)	2
2	Physiology of HNA	Practical lesson: Types of GNI according to Hippocrates and Pavlov (training conference)	3
3	Physiology of the blood system.	Practical lesson: Blood groups, blood transfusion. (solving multilevel tasks at the stage of independent work.)	3
4	Analyzer Physiology	Practical lesson: Wiring department of analyzers. (Role-playing game)	3

11. METHODOLOGICAL SUPPORT OF THE DISCIPLINE

Methodical recommendations for students in two parts - Appendix No. 3 (attached).

12. FEATURES OF THE ORGANIZATION OF TRAINING ON THE DISCIPLINE FOR INVA LEADS AND PERSONS WITH DISABILITIES

12.1. Training of people with disabilities

The department has drawn up an adapted work program using special teaching methods and didactic materials, compiled taking into account the health status of students.

12.2. In order to master the curriculum of the discipline by disabled persons and persons with disabilities the department provides:

1) for people with disabilities and visually impaired health:

- ✓ The department's website contains: lectures and practical exercises in physiology, accompanied by dubbing (by the voice of the lecturer and teachers), which can be used by students with visual impairments.
- ✓ In practical classes, the teacher devotes more time to oral talk, consultations on the topic of classes.
- ✓ At the department there are magnifying glasses, on the website of the DSMU (DSP) voiced lectures, intended for visually impaired students.

2) for people with disabilities, people with hearing disabilities:

- On the website of the department there is a text with illustrations on the Section of the discipline "Normal Physiology", which can be used by students with hearing impairments.
- Students - hearing impaired can use teaching aids with a detailed description of practical work.3)

- for people with disabilities and people with musculoskeletal disorders:

- The department organizes remote practical classes, as well as for such students on the 1st floor of the bio-building (scientific library of the DSMU) a special room is allocated where the teacher-physiologist conducts the lesson.

12.3 Education of students and persons with disabilities

can be organized jointly.

12.4. The list of educational and methodological support for independent work of students in the discipline. Educational and methodological materials for independent work of students from among the disabled and persons with disabilities are provided in forms adapted to the limitations of their health and perception of information:

Categories of students	Forms
Hearing impairment	-in printed form; lectures and method. DEVELOPMENT.
Visually impaired	-in the form of an electronic document; DSP-DSMU (lms.dgmu.ru) and on the website of the department in the AI presentation
With disorders of the musculoskeletal system	-in the form of an electronic document; DSP - DSMU (lms.dgmu.ru), and on the website of the department lectures and practical exercises with dubbing.

12.5. Fund of assessment tools for intermediate certification of students in the discipline

12.5.1. The list of funds of evaluation means correlated with the planned results of the development of the educational program for students with disabilities

Category of students	types of appraisal tools	Forms of control and assessment of learning outcomes
Hearing impaired	Tests, Online testing	Predominantly written exam
Visually impaired	Job interview, Online interview	Mainly verbal testing of MTC (individually)
With disorders of the musculoskeletal system	Solution of distance tests, control questions, conversation in the form of videoconferencing	Organization of control in DSP - DSMU (lms.dgmu.ru)

12.5.2. Methodological materials defining the procedures for assessing knowledge, skills, skills and experience of activities, characterizing the stages of the formation of competencies

When carrying out the procedure for assessing the learning outcomes of disabled people and people with disabilities, the use of technical means necessary for them in connection with their individual characteristics is envisaged.

The procedure for assessing the learning outcomes of persons with disabilities and persons with disabilities by discipline provides for the provision of information in forms adapted to the limitations of their health and perception of information:

For persons with visual impairments:

- in printed form in enlarged font;
- in the form of an electronic document;
- in the form of an audio file.

Hearing impaired:

- in printed form;
- in the form of a video file
- in the form of an electronic document.

For persons with musculoskeletal disorders;

- in printed form;
- in the form of an electronic document;
- in the form of an audio-video file.

When carrying out the procedure for assessing the learning outcomes of disabled people and people with disabilities by discipline (module), the following additional requirements are met, depending on the individual characteristics of students:

1. Instructions on the procedure for conducting the assessment procedure are provided in an accessible form (orally, in writing, and, if possible, orally using the services of a deaf-translator);
2. An accessible form for providing assignments of assessment tools (in printed form, in printed form in an enlarged font, in the form of an electronic document, assignments are read by an assistant, assignments are provided using a sign-translation (if possible));
3. An accessible form of providing answers to tasks (in writing on paper, a set of answers in your personal account, using the services of an assistant, orally).

If necessary, for students with disabilities and disabled people, the procedure for assessing learning outcomes in a discipline (or module) can be carried out in several stages.

The procedure for assessing the learning outcomes of disabled people and persons with disabilities is allowed with the use of distance educational technologies.

12.6. The list of basic and additional educational literature necessary for mastering the discipline for people with disabilities and people with disabilities

Main literature

Printed editions:

№	editions	Number of copies in the library
1	Normal physiology : textbook / under. ed. VM Smirnov.-3rd ed., Revised. and add. - M.: IC "Academy" - 2010. ISBN 978-5-7695-8029-1	376
2	Normal physiology : textbook / under. ed. LZ Tel [and others]; ed. L.Z. Tel, N.A. Aghajanyan. - M.: Litterra, 2015. -- 768 p.: ill. - ISBN 978-5-4235-0167-9.	500

Electronic publications:

1	Sudakov KV, Normal physiology [Electronic resource]: textbook / ed. K.V. Sudakov. - M.: GEOTAR-Media, 2015. -- 880 p. - ISBN 978-5-9704-3528-1 - Access mode: http://www.studmedlib.ru/book/ISBN9785970435281.html
2	Authors: Sudakov K.V., Andrianov V.V., Vagin Yu.E., Dzhebrailova T.D., Kiselev I.I., Umryukhin P.E. (voiced text)

Additional literature

Printed editions:

№	editions	Number of copies in the library
1	Study guide for practical exercises for students in two parts. Part 1. / ed. prof. T.S. SulakvelAize - CPC DSMU. - Makhachkala. - 2018. -- 96 p.	100
2	Study guide for practical exercises for students in two parts. Part 2. / ed. prof. T.S. SulakvelAize - CPC DSMU. - Makhachkala. - 2018. -- 104 p.	100

Electronic publications:

:

№	editions
1	2
1	Normal physiology [Electronic resource]: textbook / V.P. Degtyarev, N.D. Sorokina - M.: GEOTAR-Media, 2016. - http://www.studmedlib.ru/book/ISBN9785970435472.html (voiced text)

12.7. Methodical instructions for students with disabilities on mastering the discipline

Individual work is of great importance for the development of the discipline by disabled people and persons with disabilities. Individual work means two forms of interaction with the teacher: individual educational work (consultation), i.e. additional clarification of the educational material and in-depth study of the material with those students who are interested in this, who are an

important factor contributing to the individualization of training and the establishment of educational contact between the teacher and the student with a disability or student with disabilities.

12.8. Description of the material and technical base necessary for the implementation of the educational process in the discipline (see above)

The mastering of discipline by disabled people and persons with disabilities is carried out using general and special-purpose teaching aids: lectures are attached. (<https://eos-dgmu.ru/mod/url/view.php?id=10437>; <https://eos-dgmu.ru/mod/url/view.php?id=10636>) и учебники (<http://www.studmedlib.ru/book/ISBN9785970435281.html>; <http://www.studmedlib.ru/book/ISBN9785970435472.html>) и т.д.

13. CHANGE SHEET TO THE WORK PROGRAM

Changes to the work program are made on the basis of orders and orders of the rector, as well as on the basis of decisions on improving the educational and methodological support of the discipline, approved at the appropriate level (decision of the Academic Council), CKMS and registered in the list of changes.

Work program changes registration sheet

List of additions and changes made to the work program of the discipline	WP updated at a meeting of the department		
	Date	Number of the department meeting minutes	Signature of the head of the department