

**Thematic plan of seminars  
in the discipline "Physiology"  
for students of the educational program  
specialist degree  
in the specialty 33.05.01 Pharmacy,  
direction (profile) Pharmacy,  
form of study full-time  
for the 2023-2024 academic year**

№	Thematic blocks	Hours (academic )
1.	<b>Introduction to the subject. Electrical phenomena in excitable tissues<sup>1</sup>.</b> Physiology as a science, its basic concepts and subject of study. Methods of physiological research. Definition and classification of stimuli. Excitable tissues. General properties of excitable tissues. Electrical phenomena in excitable tissues. The history of their discovery. Modern ideas about the mechanisms of the emergence of biopotentials. Biological membranes, their structure and functions. Ionic asymmetry between the external and internal environment of the cell. Ion channels, their classification and role. Types of ion transport through membranes, their role <sup>2</sup> . (Part 1)	2
	<b>Introduction to the subject. Electrical phenomena in excitable tissues<sup>1</sup>.</b> State of functional rest. Resting membrane potential, its origin. Registration of RMP using microelectrode technology. Active state of tissues. Membrane action potential, its phases, their origin. The concept of excitability. A measure of excitability. The relationship between the phases of excitability and the phases of the action potential. The concept of lability of excitable tissues <sup>2</sup> . (Part 2)	1
2.	<b>Properties of excitable tissues<sup>1</sup>.</b> Basic laws of irritation of excitable tissues. The law of strength of irritation. Threshold of irritation as a measure of excitability. The all-or-none law, its relative nature. The strength-duration law. Relativity of the law. The concept of utilization time, rheobase, chronaxy. Chronaxia as a measure of excitability. The law of the steepness of the growth of the stimulus (gradient). Accommodation, modern ideas about the mechanisms of its development. Accommodation speed, critical slope <sup>2</sup> . (Part 1)	2
	<b>Properties of excitable tissues<sup>1</sup></b> Polar law of irritation. Features and local electrotonic potentials. Physiological electroton. Addition to the law by B.	1

	<p>F. Verigo. Cathodal depression. Anodal exaltation. Clinical application of the law. Structure and physiological properties of nerve fibers. Types of fibers. Mechanism of conduction of excitation along a myelinated and an unmyelinated nerve fibers. Conduction velocity and factors affecting its value. Laws of excitation conduction in the nerve.</p> <ul style="list-style-type: none"> <li>•Law of isolated conduction of excitation.</li> <li>•Law of anatomical and physiological integrity of the nerve.</li> <li>•Law of bilateral conduction of excitation<sup>2</sup> (Part 2)</li> </ul>	
3.	<p><b>Physiology of muscle tissue<sup>1</sup>.</b>  Support and movement system, its effector organs, role in the organism. Bioelectric phenomena in the muscle fiber. Features of the resting potential and action potential. Changes in skeletal muscle excitability during a single excitation cycle.  Ultramicroscopic structure of myofibrils at rest and during contraction. The concept of sarcomere<sup>2</sup>. (Part 1)</p>	2
	<p><b>Physiology of muscle tissue<sup>1</sup></b> The mechanism of muscle contraction and relaxation. Sliding filaments theory. Chemical and thermal changes in the muscle fiber. Single muscle contraction and its characteristics (muscle twitch). Phases of the action potential to phases of excitability changes and phases muscle twitch ratio. Note the features of the refractory period. Summation of muscle contractions, types of summation. Summation conditions. Tetanus, its types. Tetanus theories. Optimum and pessimum frequency of irritation. Morpho-functional features of smooth muscles<sup>2</sup>. (Part 2)</p>	1
4.	<p><b>Strength and muscle work. Fatigue<sup>1</sup>.</b>  Motor synapse (neuromuscular junction), structure, functional properties, mechanism of synaptic transmission. Pharmacological correction of the myoneural synapse. Structural and functional features of skeletal muscles. The concept of the motor unit. Types of motor units. Modes of skeletal muscle contractions (isotonic, isometric, auxotonic). Staircase relation between the strength of stimulation and the amplitude of skeletal muscle contraction<sup>2</sup>. (Part 1)</p>	2
	<p><b>Strength and muscle work. Fatigue<sup>1</sup>.</b>  Muscle strength. Factors affecting muscle strength. Muscle work under different loads. Average load rule. Muscle fatigue, theories of fatigue. Fatigue of an isolated muscle. Fatigue in isolated nerve-muscle preparation. Fatigue of the motor unit in the conditions of the body. Fatigue curve. Ergography. Local and general fatigue. Passive rest. The role of active rest according to Sechenov. Adaptation-trophic</p>	1

	phenomenon of Orbeli-Ginetsinsky. The role of the higher parts of the central nervous system in the development of fatigue <sup>2</sup> . (Part 2)	
5.	<b>Control of knowledge, skills on thematic blocks (concluding class)<sup>1</sup></b> Introduction to the subject. Electrical phenomena in excitable tissues. Properties of excitable tissues. Physiology of muscle tissue. Strength and muscle work. Fatigue <sup>2</sup> . (Part 1)	2
	<b>Control of knowledge, skills on thematic blocks (concluding class)<sup>1</sup></b> Introduction to the subject. Electrical phenomena in excitable tissues. Properties of excitable tissues. Physiology of muscle tissue. Strength and muscle work. Fatigue <sup>2</sup> (Part 2)	1
6.	<b>General physiology of the nervous system. Reflex and reflex arc. Properties of nerve centers. Inhibition in the CNS<sup>1</sup>.</b> Methods for studying the functions of the nervous system. Electroencephalography. Neuron, its definition of properties, classification. Features of <u>generation</u> and propagation of excitation in the neuron. Synapses in the CNS. Structure, classification, functional properties. Chemical synapses. Neurotransmitter mechanisms of excitation propagation in the CNS. Pharmacological correction of the chemical synapse work. Electrical synapses. Functional properties, mechanisms of synaptic transmission. The concept of reflex. Classification of reflexes. The main components of the reflex arc. Reflex time, factors affecting reflex time. The receptive field of the reflex. Nerve centers and their properties <sup>2</sup> (Part 1)	2
	<b>General physiology of the nervous system. Reflex and reflex arc. Properties of nerve centers. Inhibition in the CNS<sup>1</sup>.</b> Development of the reflex theory in the works of I. M. Sechenov, I. P. Pavlov, P. K. Anokhin. PK Anokhin's doctrine of functional systems. Mechanisms of FS. Structure of the FS. Useful adaptive result as the main system-forming factor. The role of back afferentation. Inhibition in the central nervous system. The history of the discovery of inhibition by I. M. Sechenov. Types of inhibition. Mechanisms of central nerve inhibition. Comparative characteristics of EPSP and IPSP. Postsynaptic inhibition, its mechanisms and physiological significance. Presynaptic inhibition, its mechanisms and physiological significance. Inhibition, not associated with the function of inhibitory synapses. Its types, physiological significance. Basic	1

	principles of coordination of reflex activity. Divergence and irradiation of excitation. Convergence and a common final path. Positive feedback. Dominant <sup>2</sup> (Part 2)	
7.	<p><b>Particular physiology of the central nervous system. The structure and functions of the subcortical structures of the brain<sup>1</sup>.</b></p> <p>Spinal cord: morphological and functional features, Bell-Magendie law, properties of spinal cord neurons, main functions of the spinal cord: conduction, reflex. The most important spinal reflexes (somatic and autonomic), (reflexes of clinical significance). Hind brain: medulla oblongata, pons. Main functions of the hindbrain. Midbrain. Motor centers of the brainstem (red nucleus, Deiters nucleus, some parts of the reticular formation). Decerebrate rigidity, neural mechanisms. Tonic brainstem reflexes<sup>2</sup> (Part 1)</p>	2
	<p><b>Particular physiology of the central nervous system. The structure and functions of the subcortical structures of the brain<sup>1</sup>.</b></p> <p>Reticular formation of the brain stem. (Descending and ascending influences of the reticular formation of the brain stem). The mechanism of maintaining muscle tone at the level of the spinal cord. Cerebellum. Functions of the cerebellum. Diencephalon. Thalamus. Hypothalamus. The main functions of the diencephalon. The most important subcortical (basal) nuclei. Functions of the subcortical nuclei. Limbic system of the brain. Functions of the limbic system<sup>2</sup>. (Part 2)</p>	1
8.	<p><b>Physiology of the autonomic nervous system<sup>1</sup>.</b></p> <p>The general plan of the structure and the main properties of the ANS. Characteristics of the sympathetic division of the ANS, its Neurotransmitters, role in the body. Adrenoreceptors. Characteristics of the parasympathetic division of the ANS, its neurotransmitters, role in the body. Cholinergic receptors. Synergism and relative antagonism of the influences of the sympathetic and parasympathetic divisions of the ANS on body functions<sup>2</sup> (Part 1)</p>	2
	<p><b>Physiology of the autonomic nervous system<sup>1</sup>.</b></p> <p>Metasympathetic division of the ANS, its Neurotransmitters, role in the organism. Bineuronal organization of efferent autonomic nerve fibers. Ganglia of the autonomic nervous system. Features of the occurrence of excitation in the ganglia of the ANS. Transmission of impulses in the synapses of the ANS. Adrenergic and cholinergic structures. Autonomic reflexes of clinical significance (ocular-cardiac reflex, Goltz reflex, skin dermographism, respiratory-</p>	1

	cardiac, etc.). Adaptation-trophic influence of ANS on organs and tissues. Segmental levels of regulation of autonomic functions (intramural, para- and prevertebral ganglia, spinal cord, brain stem). Suprasegmental levels of regulation of autonomic functions (hypothalamus, limbic system, cerebral cortex) <sup>2</sup> (Part 2)	
9.	<b>The main components of the endocrine system<sup>1</sup>.</b> The concept of endocrinology. The concept of the endocrine gland, endocrine and neuroendocrine systems. Main components of the endocrine system (local and endocrine systems, APUD system), the hypothalamic-pituitary, sympathoadrenal systems <sup>2</sup> (Part 1)	2
	<b>The main components of the endocrine system<sup>1</sup>.</b> Functional features of hormones that distinguish them from other biologically active substances. Classification of hormones <sup>2</sup> (Part 2)	1
10.	<b>Physiology of endocrine glands<sup>1</sup>.</b> The hypothalamic-pituitary system and its functions. The pituitary gland and its hormones. Hyper- and hypofunction. Parathyroid gland and its hormones, hyper- and hypofunction. The thyroid gland and its hormones, hyper- and hypofunction <sup>2</sup> . (Part 1	2
	<b>Physiology of endocrine glands<sup>1</sup>.</b> Endocrine functions of the pancreas. Functions of the adrenal medulla. The role of adrenaline in the body. Hormones of the adrenal cortex. Their role in the regulation of metabolism and body functions. sex hormones <sup>2</sup> . (Part 2)	1
11	<b>Control of knowledge, skills on thematic blocks (concluding class)<sup>1</sup>:</b> General physiology of the central nervous system. Reflex and reflex arc. Properties of nerve centers. Inhibition in the CNS. Particular physiology of the central nervous system. The structure and functions of the subcortical structures of the brain. Physiology of the autonomic nervous system. The main components of the endocrine system. Physiology of the endocrine glands <sup>2</sup> . (Part 1)	2
	<b>Control of knowledge, skills on thematic blocks (concluding class)<sup>1</sup>:</b> General physiology of the central nervous system. Reflex and reflex arc. Properties of nerve centers. Inhibition in the CNS. Particular physiology of the central nervous system. The structure and functions of the subcortical structures of the brain. Physiology of the autonomic nervous system. The main components of the endocrine system. Physiology of the	1

	endocrine glands <sup>2</sup> . (Part 2)	
12.	<p><b>Physiology of sensory systems. The concept of analyzers. Visual analyzer (sensory system)<sup>1</sup>.</b>  I. P. Pavlov's doctrine about analyzers (sensory systems). General principles of structure and functioning of analyzers. Main functions of analyzers. Physiology of receptors. Classification of receptors. Adequate and inadequate receptor stimuli. The mechanism of excitation of receptors. Receptor and generator potential. Coding in receptors. Signal discrimination. Absolute and differential thresholds of sensation. Adaptation of analyzers. Transmission and conversion of signals. Information encoding. Detection and recognition of images<sup>2</sup>. (Part 1)</p>	2
	<p><b>Physiology of sensory systems. The concept of analyzers. Visual analyzer (sensory system)<sup>1</sup></b>  Optical system of the eye. Accommodation. Abnormalities of refraction. Perception and processing of signals in the retina. Conductive and cortical divisions of the visual sensory system. Color perception, light and dark adaptation, perception of space<sup>2</sup>. (Part 2)</p>	1
13.	<p><b>Physiology of sensory systems. Auditory and vestibular analyzers (sensory systems)<sup>1</sup></b>  Receptor department of the auditory sensory system. The mechanism of perception of sound vibrations. Distinguish pitch and sound intensity. Conductive and cortical divisions of the auditory analyzer. Central mechanisms for processing sound information. Vestibular sensory system: receptor, conduction and cortical divisions<sup>2</sup> (Part 1).</p>	2
	<p><b>Physiology of sensory systems. Pain, tactile, temperature, olfactory and taste analyzers (sensory systems)<sup>1</sup>.</b>  Pain sensory system: receptor, conduction and cortical divisions. Tactile sensory system: receptor, conduction and cortical divisions. Temperature sensory system: receptor, conductor and cortical divisions. Taste sensory system: receptor, conduction and cortical divisions. Olfactory sensory system: receptor, conduction and cortical divisions<sup>2</sup>. (Part 2)</p>	1
14.	<p><b>Higher nervous activity. Physiology of the conditioned reflex<sup>1</sup>.</b>  The structure and functions of the cerebral cortex. Localization of functions in the cortex. Methods for studying the functions of the cortex. Electroencephalogram. General characteristics and properties of conditioned reflexes, their difference from unconditioned ones. Classification of conditioned and unconditioned reflexes. Methodology and basic rules for the development of conditioned reflexes, their</p>	2



	types. Modern ideas about the mechanism of formation of a temporary connection <sup>2</sup> (Part 1)	
	<p><b>Higher nervous activity. Physiology of the conditioned reflex<sup>1</sup>.</b></p> <p>Inhibition of conditioned reflexes. Unconditional (external) and conditional (internal) inhibition, their main differences. Mechanism of external inhibition. Protective (Extreme) inhibition. Conditioned inhibition: extinction of the conditioned reflex, differentiation, delay, conditioned brake. Modern ideas about the mechanism of internal inhibition. Irradiation and concentration of the process of excitation and the cerebral cortex<sup>2</sup>. (Part 2)</p>	1
	<p><b>Features of the human higher nervous activity<sup>1</sup>.</b></p> <p>Analytical and synthetic activity of the cerebral cortex. I. P. Pavlov's doctrine of the dynamic stereotype. Mechanisms of sleep, modern theories. Physiological changes during sleep. Interaction of the cerebral cortex, hypothalamus and reticular formation in the mechanisms of sleep and wakefulness<sup>2</sup>. (Part 1)</p>	2
15.	<p><b>Features of the human higher nervous activity. Analytical and synthetic activity of the cerebral cortex<sup>1</sup>.</b></p> <p>I.P. Pavlov's doctrine of higher nervous activity. Types of higher nervous activity. Higher nervous activity disorders. Experimental neuroses. IP Pavlov's doctrine of the first and second signaling systems. Features of the human types of higher nervous activity. Brain functional asymmetry. The physiology of the "split brain". Neurophysiological aspects of speech. Speech centers. Speech disorders. Mechanisms of purposeful human activity. Physiology of emotions<sup>2</sup>. (Part 2)</p>	1
	<p><b>Control of knowledge, skills, on thematic blocks (concluding class)<sup>1</sup>:</b></p> <p>Physiology of sensory systems. The concept of analyzers (sensory systems). Visual analyzer. Auditory and vestibular analyzers. Pain, tactile, temperature, olfactory and taste analyzers. Higher nervous activity. Physiology of the conditioned reflex. Features of human higher nervous activity<sup>2</sup>. (Part 1)</p>	2
16.	<p><b>Control of knowledge, skills, on thematic blocks (concluding class)<sup>1</sup>:</b></p> <p>Physiology of sensory systems. The concept of analyzers (sensory systems). Visual analyzer. Auditory and vestibular analyzers. Pain, tactile, temperature, olfactory and taste analyzers. Higher nervous activity. Physiology of the conditioned reflex. Features of human higher nervous</p>	1

	activity <sup>2</sup> . (Part 2)	
17.	<p><b>Metabolism and energy exchange. Thermoregulation<sup>1</sup>.</b>  Methods for studying the energy expenditure of the body: a) direct calorimetry; b) indirect calorimetry. Respiratory coefficient and its significance in the study of metabolic rate. Basal metabolic rate and factors affecting its value. Methods for determining the proper values of the basal metabolic rate. Body surface rule. Energy exchange during physical and mental labor. The distribution of the population into groups depending on the type of work. Specific dynamic action of food. Principles of regulation of body temperature. Thermoregulatory centers. Mechanisms of heat production. Heat loss mechanisms. Muscular work and thermoregulation. Hardening<sup>2</sup>. (Part 1)</p>	2
	<p><b>Physiology of nutrition<sup>1</sup>.</b>  Diet. Nutrition theories. Food classification. The role of proteins, fats and carbohydrates in nutrition. Physiological norms of nutrition. Principles of dietary planning. The concept of protein minimum and protein optimum. Proteins are complete and incomplete. Caloric coefficients of nutrients. Daily requirement for minerals and water. Importance of vitamins in nutrition<sup>2</sup> (Part 2).</p>	1
18.	<p><b>Properties of the heart muscle<sup>1</sup></b>  Anatomical and histological features of the structure of the heart. The main physiological properties of the heart. Automatism. Anatomical substrate and the nature of automatism, the action potential of the pacemaker cells. The leading role of the sinoatrial node. The gradient of automatism. Features of excitation in the heart muscle. Cardiomyocyte action potential, its phases and origin. Features of excitability of the heart muscle. The refractory period<sup>2</sup> (Part 1)</p>	2
	<p><b>Properties of the heart muscle<sup>1</sup>.</b> Contractility. Coupling of the processes of excitation and contraction in the heart muscle, the role of extracellular calcium. Obeying the “All-or-none law”. Extrasystole. Conductivity, its features, the speed of excitation through various parts of the heart. Cardiac cycle, its phases. Blood pressure in the cavities of the heart in various phases of the cardiac cycle, valve function<sup>2</sup>. (Part 2)</p>	1
19.	<p><b>The heart activity. Methods for studying the heart. ECG<sup>1</sup>.</b>  Electrocardiography (ECG) as a method of recording the biopotentials of the heart. Biophysical basis of ECG. Main ECG leads. Normal human ECG, its genesis, clinical significance<sup>2</sup>. (Part 1)</p>	2
	<p><b>The heart activity. Methods for studying the heart. ECG<sup>1</sup>.</b></p>	1



	Basic indicators of heart activity: frequency and strength of heart contractions, systolic and minute blood volume at rest and during load. Heart sounds, apical impulse, their origin and characteristics. Phonocardiography, its clinical significance <sup>2</sup> . (Part 2)	
20.	<b>Regulation of heart activity</b> <sup>1</sup> . Intracardiac mechanisms of heart regulation: Intracardiac heterometric and homeometric mechanisms. Intercellular regulation. The «All-or-none law», creative connections. Frank-Starling law. Intracardiac nervous regulation. The concept of peripheral intracardiac reflexes. Cholinergic and adrenergic mechanisms <sup>2</sup> . (Part 1)	2
	<b>Regulation of heart activity</b> <sup>1</sup> . Extracardiac regulation. Innervation of the heart. The influence of sympathetic and parasympathetic nerves on the heart. Central reflexes. The most important reflexogenic zones, chemo- and baroreceptive mechanisms. Conjugate reflexes – Danini-Aschner, Goltz. Humoral regulation. The influence of hormones, electrolytes, metabolites on heart function. Interaction of nervous and humoral mechanisms <sup>2</sup> . (Part 2)	1
21.	<b>Basic principles of hemodynamics</b> <sup>1</sup> . Morpho-functional classification of blood vessels. Volumetric blood flow velocity. Factors on which it depends. Linear velocity of blood flow. Velocity in arteries, capillaries, veins. Time for complete blood circulation. The importance of vascular elasticity for blood flow. Vascular resistance. Factors influencing its value. Total peripheral resistance <sup>2</sup> . (Part 1)	2
	<b>Basic principles of hemodynamics</b> <sup>1</sup> . Blood pressure in different parts of the vascular system. Arterial pressure. Factors influencing its value. Main indicators of blood pressure: systolic, diastolic, pulse and mean hemodynamic pressure. Arterial pulse, its origin, pulse characteristics, registration <sup>2</sup> . (Part 2)	1
22.	<b>Regulation of vascular tone. Regional blood circulation. Lymph and lymph circulation</b> <sup>1</sup> . The concept of vascular tone, its types. Basal tone, its origin. Innervation of blood vessels. Vasoconstrictor nerves. Neurogenic mechanisms of vasodilation. Vasomotor center, its structure and functions. Reflexogenic zones and depressor reflexes. Intrinsic and conjugate reflexes of the cardiovascular system <sup>2</sup> . (Part 1)	2
	<b>Regulation of vascular tone. Regional blood circulation. Lymph and lymph circulation</b> <sup>1</sup> . Humoral regulation of vascular tone. Regional blood flow. Mechanisms of regulation. Features of coronary, cerebral blood flow, blood circulation in the pulmonary circuit <sup>2</sup> . (Part 2)	1

	<b>Physiology of the excretory system<sup>1</sup></b> . Organs and processes of excretion. Water-salt exchange. Kidneys and their function. The structure of the nephron. Features of the nephron blood supply. The process of urine formation. Glomerular filtration. Tubular reabsorption. Tubular secretion. Osmotic dilution and concentration of urine <sup>2</sup> (Part 1)	2
23.	<b>Physiology of the excretory system<sup>1</sup></b> . Homeostatic function of the kidneys. The role of the kidneys in osmoregulation and volume regulation. The role of the kidneys in the regulation of the ionic composition of the blood. The role of the kidneys in the regulation of acid-base state. Excretory function of the kidneys. Endocrine function of the kidneys. Metabolic kidney function. Nervous regulation of kidney activity. Diuresis. Composition of urine. Urination. Hemodialysis. Artificial kidney <sup>2</sup> (Part 2)	1
	<b>Control of knowledge, skills, on thematic blocks (concluding class)<sup>1</sup></b> : Properties of the heart muscle. Activity of the heart. Methods for studying the heart. Electrocardiogram. Regulation of heart activity. Basic principles of hemodynamics. Regulation of vascular tone. Regional blood circulation. Lymph and lymph circulation. Physiology of the excretory system <sup>2</sup> . (Part 1)	2
24.	<b>Control of knowledge, skills, on thematic blocks (concluding class)<sup>1</sup></b> : Properties of the heart muscle. Activity of the heart. Methods for studying the heart. Electrocardiogram. Regulation of heart activity. Basic principles of hemodynamics. Regulation of vascular tone. Regional blood circulation. Lymph and lymph circulation. Physiology of the excretory system <sup>2</sup> . (Part 1)	1
	<b>Physicochemical properties of blood<sup>1</sup></b> . Blood functions. Blood composition. The amount of blood in the body, its relative constancy. Blood plasma, its quantity, composition. Electrolyte composition. Osmotic pressure. Osmotic resistance of erythrocytes. Regulation of constancy. Blood plasma proteins, their physiological role. Oncotic pressure, its role <sup>1</sup> . (Part 1)	2
25	<b>Physicochemical properties of blood<sup>1</sup></b> . Erythrocyte sedimentation rate (ESR). Mechanism, clinical significance, indicators. Blood pH. Blood buffer systems. Regulation of blood pH constancy <sup>2</sup> . (Part 2)	1
	<b>Formed elements of blood<sup>1</sup></b> . Red blood cells, structure and functions. Normal content in circulating blood. Hemolysis of erythrocytes, its types. Erythropoiesis, its regulation. Hemoglobin, physiological significance, types and compounds. Color index, clinical significance, magnitude.	2
26.		

	The role of white blood in the body. Leukocytes, their characteristics <sup>2</sup> . (Part 1)	
	<b>Formed elements of blood</b> <sup>1</sup> . Specific and nonspecific immunity. Its mechanisms. Leukopoiesis, its regulation. Leukocyte formula, clinical significance. Platelets. Structure and functions <sup>2</sup> . (Part 2)	1
27.	<b>Hemostasis. Blood types</b> <sup>1</sup> . The system for regulating the state of blood aggregation (RAS), its main elements. Clinical and physiological role. The concept of hemostasis, the process of blood coagulation, its phases. Vascular-platelet hemostasis. Coagulation hemostasis. External and internal coagulation pathways. Anticoagulant blood system. Physiological anticoagulants. Their role is in maintaining the fluid state of the blood. Fibrinolysis, its phases <sup>2</sup> . (Part 1)	2
	<b>Hemostasis. Blood types</b> <sup>1</sup> . Blood groups. AB0 system. Rh factor, its significance for medical practice. Physiological and clinical basis of blood transfusion <sup>2</sup> . (Part 2)	1
28.	<b>External respiration</b> <sup>1</sup> . Principles of organization of the functional respiratory system. Breathing, its main stages. The mechanism of external respiration. Biomechanics of inhalation and exhalation. Pressure in the pleural cavity and its origin and role in the mechanism of external respiration. Changes in intrapleural pressure during different phases of the respiratory cycle. Vital lungs capacity its components. Methods for their determination. Residual volume. Minute volume of pulmonary ventilation and its changes under various loads, methods for its determination. "Dead space" and effective pulmonary ventilation. Why rare and deep breathing is more effective. Composition of atmospheric and exhaled air. Alveolar air as the internal environment of the body. The concept of partial pressure of gases. Gas exchange in the lungs. Partial pressure of gases (O <sub>2</sub> and CO <sub>2</sub> ) in the alveolar air and gas tension in the blood <sup>2</sup> . (Part 1)	2
	<b>External respiration</b> <sup>1</sup> . Basic laws of gas transport through a membrane. Gas exchange between blood and tissues. O <sub>2</sub> and CO <sub>2</sub> tension in the blood, tissue fluid and cells. Transport of gases by blood: a) transport of O <sub>2</sub> by blood; oxyhemoglobin dissociation curve, its characteristics; blood oxygen capacity; b) transport of carbon dioxide in the blood; carbonic anhydrase value; relationship between O <sub>2</sub> and CO <sub>2</sub> transport <sup>2</sup> . (Part 2)	1
29.	<b>Regulation of respiration</b> <sup>1</sup> . Innervation of the respiratory muscles. Respiratory center. Modern cosept about structure and localization of respiratory center. Automation of the respiratory center. Dependence of the respiratory center	2

	activity on the gas composition of the blood. The role of chemoreceptors in the regulation of respiration. The role of mechanoreceptors in the regulation of respiration. The role of carbon dioxide in the regulation of respiration. The mechanism of the first breath of a newborn. The mechanism of periodic activity of the respiratory center. Theories of the origin of periodic activity of the respiratory center. The influence of irritation of various receptors and parts of the central nervous system on the respiratory center. Conditioned reflex regulation of breathing <sup>2</sup> . (Part 1)	
	<b>Regulation of respiration<sup>1</sup></b> . Protective breathing reflexes. Features of breathing in various conditions: a) breathing during muscle work; b) breathing at low atmospheric pressure (altitude sickness (disease)); c) breathing at high atmospheric pressure (caisson disease); d) artificial respiration; e) periodic breathing <sup>2</sup> . (Part 2)	1
30	<b>Control of knowledge, skills, on thematic blocks (concluding class)<sup>1</sup></b> : Physico-chemical properties of blood. Formed elements of blood. Hemostasis. Blood types. External breathing. Regulation of respiration <sup>2</sup> . (Part 1)	2
	<b>Control of knowledge, skills, on thematic blocks (concluding class)<sup>1</sup></b> : Physico-chemical properties of blood. Formed elements of blood. Hemostasis. Blood types. External breathing. Regulation of respiration <sup>2</sup> . (Part 1)	1
31.	<b>Digestion in the oral cavity and stomach<sup>1</sup></b> . The essence of the digestive process. A functional system that supports constant blood nutrient levels. Methods for studying the functions of the digestive glands. The essence of the chronic research method created by I.P. Pavlov, its advantages. The role of the oral cavity in the digestive process. Composition and properties of saliva. Reflex arc diagrams of the unconditioned salivary reflex. The adaptive nature of salivation to various food and rejected substances <sup>2</sup> . (Part 1)	2
	<b>Digestion in the mouth and stomach<sup>1</sup></b> . General characteristics of digestive processes in the stomach. Composition and properties of gastric juice. Regulation of gastric secretion: a) cephalic phase, b) the second phase is gastric (neurohumoral); main foods that stimulate gastric secretion; c) third phase – intestinal <sup>2</sup> . (Part 2)	1
32.	<b>Digestion in the intestine<sup>1</sup></b> . Pancreatic secretion. Composition and properties of pancreatic juice. Regulation of pancreatic secretion: a) complex reflex phase; b) humoral phase. Liver functions. The role of bile in digestion. Composition and properties of bile. Regulation of bile formation. Basic foods that stimulate bile formation. The	2

	mechanism of bile secretion, its reflex and humoral regulation. Intestinal juice, its composition and properties <sup>2</sup> . (Part 1)	
	<b>Digestion in the intestine<sup>1</sup></b> . Pancreatic secretion. Composition and properties of pancreatic juice. Regulation of pancreatic secretion: a) complex reflex phase; b) humoral phase. Liver functions. The role of bile in digestion. Composition and properties of bile. Regulation of bile formation. Basic foods that stimulate bile formation. The mechanism of bile secretion, its reflex and humoral regulation. Intestinal juice, its composition and properties <sup>2</sup> . (Part 1)	1
33.	<b>Digestion in the intestine<sup>1</sup></b> . Types of contractions of the gastrointestinal tract muscles, their characteristics. Regulation of the motor function of the gastrointestinal tract: Absorption of basic nutrients, mechanism of absorption, its regulation. Food center. Modern ideas about the mechanisms of hunger, thirst, satiety <sup>2</sup> . (Part 1)	2
	<b>Digestion in the intestine<sup>1</sup></b> . Types of contractions of the gastrointestinal tract muscles, their characteristics. Regulation of the motor function of the gastrointestinal tract: Absorption of basic nutrients, mechanism of absorption, its regulation. Food center. Modern ideas about the mechanisms of hunger, thirst, satiety <sup>2</sup> . (Part 1)	1
34.	<b>Control of knowledge, skills, on thematic blocks (concluding class)<sup>1</sup></b> : Digestion in the oral cavity and stomach. Digestion in the intestine <sup>2</sup> .(part 1)	2
	<b>Control of knowledge, skills, on thematic blocks (concluding class)<sup>1</sup></b> : Digestion in the oral cavity and stomach. Digestion in the intestine <sup>2</sup> .(part 1)	1
	Total	102

<sup>1</sup> -Subject

<sup>2</sup> - essential content (if necessary)

Considered at the meeting of the department of Normal physiology "25" May 2023, protocol N 9 a

Head of the Department



S.V.Klauchek