

**Thematic plan of lecture-type classes
in discipline «Normal Physiology»
for students of 2025 year of admission
under the educational programme
specialist degree in the specialty 31.05.01 General Medicine
specialisation (profile) General Medicine
form of study full-time
for the 2025-2026 academic year**

№	Topics of lecture-type classes	Hours (academic)
2nd semester		
1.	<p>Normal physiology and its significance in the future professional activity of a doctor. Physiology of excitable tissues. Modern assessment of achievements and the applied aspect.</p> <p>Introduction to Normal Physiology. Physiology of Excitable Tissues.¹ Physiology is the science of the vital activity of the organism as a whole, its interaction with the external environment, and the dynamics of vital processes. Modern concepts of the structure and function of biological membranes, and electrical processes in excitable tissues. Resting potential. Action potential. Mechanisms of their origin. Excitability and its changes. The relationship between the phases of excitability and the phases of the action potential and muscle contraction. Refractory period. Tetanus and its types. Laws of irritation.²</p> <p>Mechanisms of excitation propagation in unmyelinated and myelinated fibers. Characteristics of nerve excitability. Laws of excitation conduction in nerve fibers. Speed of nerve impulse conduction. Features of synapse structure and classification. Mechanism of excitation transmission in synapses. Functional properties of synapses. Mediator processes in synapses. Electrical phenomena of postsynaptic membranes. Synapses with electrical transmission of excitation. Neuromuscular junction.²</p> <p>Physiological properties of skeletal muscles and internal organ muscles.¹ Physical and physiological properties of muscles. Microstructure of skeletal muscle fibers. Modern theory of muscle contraction. Bioelectric, chemical, and thermal processes in muscles. Motor units. Single contraction and its phases. Summation of contractions and tetanus. Optimum and pessimum (N.E. Vvedensky). Muscle strength and work. Dynamometry. Ergography. Law of average loads. The main differences in the structure and functioning of skeletal and smooth muscles. Features of muscle contraction in individuals with different levels of physical fitness.²</p>	2
2.	<p>Physiology of the Central Nervous System. Applied Aspects of the Studied Issues in a Physician's Professional Thinking.</p> <p>General Principles of the Central Nervous System¹ The Role of the CNS in the Adaptive Activity of the Body. The Main Methods of Studying the Central Nervous System. The Reflex Principle of the Nervous System. The Pattern and Features of Excitation in the Central Nervous System (Summation, Transformation, and Post-Tetanic</p>	2

	Potentiation). Reflex. Reflex Arc and Reflex Ring. Classification of Reflexes. Feedback afferentation and its significance. General principles of the doctrine of functional systems. General principles of the coordination activity of the CNS. Inhibition in the CNS and its types. Classification and mechanisms of various types of inhibition. Principles of the coordination activity of the CNS. Synapses in the CNS. Nervous centers and their properties. ²	
3.	Physiology of human behavior. Motivations. Emotions. Memory. Theoretical and applied aspects of the problem in the development of professional thinking of a future doctor. Physiology of higher nervous activity and behavior. ¹ Conditioned reflex as a form of adaptation of animals and humans to changing conditions of existence. Patterns of formation and manifestation of conditioned reflexes. Classification of conditioned reflexes. Physiological mechanisms of formation of conditioned reflexes. Inhibition in higher nervous activity. Types of inhibition. Physiology of sleep. Phases of sleep. Active and passive sleep. Electrophysiological characteristics of sleep. Theories of the origin of sleep. Interaction of the cerebral cortex, hypothalamus, and reticular formation in the mechanisms of sleep and wakefulness. Physiological basis of hypnotic states. Dreams. ² Mechanisms of purposeful behavior. ¹ Central architectonics of purposeful behavioral act (P.K.Anokhin). Motivations. Classification of motivations. Mechanisms of their origin. The role of brain structures in the formation of motivations. Emotions. Types of emotions. Mechanisms of their origin. The role of various brain structures in the formation of emotional states. The significance of emotions for the organization of behavior. Emotional stress. Memory. Types of memory. The concept of mechanisms of short-term and long-term memory. I.P. Pavlov's theory of types of higher nervous activity. The role of upbringing in formation the typological properties of higher nervous activity. Features of human higher nervous activity. I.P. Pavlov's theory of the first and second signal systems. ²	2
	Total	6
	3rd semester	
1.	Physiology of the heart. Modern assessment of achievements. New approaches to diagnostics. Physiology of the heart. Electrocardiography. ¹ Physiological properties of the myocardium. Excitability, conductivity, and contractility. The conduction system of the heart. The nature of cardiac automatism. The cardiac cycle and its phases. Methods of studying cardiac activity. Electrical phenomena in the heart. Electrocardiography and its characteristics, and its clinical significance. ² Regulation of heart activity ¹ General principles of regulation of cardiac output. Myogenic regulation. Innervation of the heart. Reflex regulation of cardiac activity. Own, associated, and nonspecific cardiac reflexes. Interaction of intracardial and extracardial neural regulatory mechanisms. Humoral regulation of heart function. Conditioned reflex	2

	regulation of cardiac activity. Hormonal function of the heart. ²	
2.	<p>Physiology of the blood system. The importance of knowledges of the parameters of the blood system and the mechanisms for maintaining them in medical education.</p> <p>Physiology of the blood system. Physical and chemical properties of blood. Physiology of red blood cells. Blood types.¹ Composition, quantity, and functions of blood. Plasma and its composition. Plasma proteins. Hematocrit. Osmotic and oncotic pressure of blood and its significance. Physical and chemical properties of blood. Red blood cells: structure, quantity, counting methods, and functions. Structure, properties, and quantity of hemoglobin. Its compounds. Color index. The erythrocyte sedimentation rate, mechanisms, and factors affecting it. Hemolysis and its types. Regulation of erythropoiesis. The concept of the blood types system. The ABO system: characteristics of blood groups and compatibility. The Rh system. Indications and rules for blood transfusion. Inheritance of blood groups. Conditions for Rh conflict between the mother and the fetus.²</p> <p>Physiology of leukocytes. Physiology of platelets. Blood clotting.¹ Leukocytes, their types, number, and counting methods. Functions of different types of leukocytes. Leukocyte formula. Platelets, their number, structure, and functions. Hemostasis. Blood clotting process. Factors and phases of blood clotting. Coagulation, anticoagulation, and fibrinolytic systems of blood. Factors that accelerate and slow down blood clotting².</p>	2
3.	<p>Physiology of digestion, features, and regulatory mechanisms. The importance of theoretical knowledge and applied aspects in shaping a doctor's mindset.</p> <p>Физиологические основы голода и насыщения. Физиология пищеварения в ротовой полости и желудке.¹ Физиологические основы голода и насыщения. Пищеварение в полости рта. Количество, состав, свойства слюны, регуляция её секреции. Пищеварение в желудке. Состав и свойства желудочного сока. Регуляция секреции желудочных желез. Фазы желудочной секреции. Моторная и эвакуаторная деятельность желудка, её регуляция.²</p>	2
	Total	6

¹ – topic

² – essential content

Considered at the meeting of the department of Normal physiology "20" May 2025, protocol N 10

Head of the Department



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