

AMENDMENTS AND CHANGES TO THE CURRICULUM IN THE EDUCATIONAL DISCIPLINE

«Human Anatomy and Physiology»

for the specialty 07-07-0912-01 «Pharmacy»

for 2025/2026 academic year

Amendments and changes	Basis/Reason
Use in the educational process as the basic (main) literature: 1. Нормальная физиология : учебник = Normal Physiology : textbook / В. В. Зинчук [и другие] ; под редакцией В. В. Зинчука. – Минск : Вышэйшая школа, 2020. — 496 р.	Department meeting (protocol №16 of 30.05.2025)
Changes have been introduced into the Academic discipline curricular chart (appendix 1)	Educational Plan for 2025/2026 academic year

The curriculum is revised and approved at the department meeting Normal physiology (protocol №16 of 30.05.2025)

Head of the Normal physiology department

V. A. Pereverzev

APPROVED

Dean of Medical Faculty for International Students

O. S. Ishtutin

ACADEMIC DISCIPLINE CURRICULAR CHART

Appendix № 1

Section, topic #	Section (topic) name	Number of hours		Supervised student independent work	Practical skills	Form of control	
		lectures	laboratory			of practical skills	of current / intermediate assessment
	1 semester						
	Lectures						
1.	The subject and tasks of human anatomy and physiology. Biological basis of human life activity. Fundamentals of information exchange between the cell and the environment.	1,5					
2.	General concept of tissues. Epithelial tissues: types, peculiarities of structure, functions	1,5					
3.	Physiology of blood system	1,5					
4.	Hemostasis. Blood types	1,5					
5.	Endocrine system, physiological role and regulation of hormone formation. Mechanisms of hormonal regulation of physiological functions	1,5					
6.	Electrical signaling. Basic laws of excitable tissues response to the stimulus action.			1,5			Electronic tests, interview.

	Biological potentials. Changes of excitability during excitation				
7.	Structure and functions of peripheral nerves, conduction of excitation along them. Synaptic transmission		1,5		Electronic tests, interview.
8.	Muscle tissue: types, structure, functions. Skeletal and smooth muscles tissues.		1,5		Electronic tests, interview.
9.	General physiology of central nervous system. Nervous centers. Reflexory theory	1,5			
10.	Special anatomy and physiology of central nervous system		1,5		Electronic tests, interview.
11.	Autonomic nervous system: structure, functions, mechanisms of control of internal organs work. Autonomic reflexes.	1,5			
12.	Structure and functions of heart and vessels. Cardiac cycle. Concepts of heart automaticity. Regulation of heart activity	1,5			
	Laboratory classes				
1.	Introduction. The subject and tasks of human anatomy and physiology: history, contribution of domestic scientists. Biological basis of human life activity, cell theory. Laboratory works: Studying the receptor mechanism of adrenaline's effect on heart rate	3	–	Safety rules when working with physiological workshop: safety rules when working with electrical equipment, actions in case of fire, general rules of first aid	Defense of laboratory works. Situation-problem solving. Electronic tests, interview, reports, theses, control works.
2.	General concept of tissues. Connective tissues: types and functions. Human skeleton. Laboratory works: Analysis of structure features of connective tissue proper Studying the regulation mechanisms of calcium and phosphorus metabolism in the organism	3	–	Description of morphological structures of the human organism (comparative characteristics of four types of tissues)	Defense of laboratory works. Situation-problem solving. Electronic tests, interview, reports, theses, control works.

	Studying the structure of human skeleton.					
3.	Fluid media of the body. Physico-chemical properties of the blood Laboratory works: Determination of osmotic resistance of red blood cells Studying the different types of hemolysis Determination of the hematocrit	3	–	Measures to prevent infection with viral hepatitis and human immunodeficiency virus (HIV) during the blood and other biological materials analysis Physiological assessment of parameters in complete blood count (hematocrit)	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
4.	Features of structure and physiological functions of erythrocytes. Hematopoiesis. Erythropoiesis. Features of structure and physiological functions of leukocytes. Leukocytopoiesis. Laboratory works: Technique of taking the capillary blood. Calculation of color index and other erythrocyte indexes. Determination of ESR. Determination of hemoglobin count by Sahli's method. Physiological evaluation of complete blood count result.	3	–	Measures to prevent infection with viral hepatitis and human immunodeficiency virus (HIV) during the blood and other biological materials analysis Physiological assessment of parameters in complete blood count (red blood cells count, hematocrit, hemoglobin, color index and RBC indices, white blood cells count and leukocyte count and leukocyte formula, Panchenkov's ESR method)	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.

5.	Thrombocytes: features of structures and functions. Thrombocytopoiesis. Hemostasis system. Blood types systems Laboratory works: Determination and physiological evaluation of primary hemostasis indices Blood typing in ABO system using standard sera Blood typing in Rhesus system Blood typing in ABO and Rhesus systems using monoclonal antibodies (reagents)	3	–	Measures to prevent infection with viral hepatitis and human immunodeficiency virus (HIV) during the blood and other biological materials analysis Physiological assessment of parameters in complete blood count (platelet count) Assessment of primary hemostasis indices (bandage test) Assessment of result of blood typing in ABO and Rh systems using standard sera and monoclonal antibodies	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
6.	Concluding lesson on the sections "The subject and tasks of anatomy and physiology. Tissues, their types. Connective tissues: structure, types, functions. Blood"	3	–	Safety rules when working with physiological workshop: safety rules when working with electrical equipment, actions in case of fire, general rules of first aid Description of morphological structures of the human organism (comparative characteristics of four		Colloquium

				types of tissues) Description of morphological structures of skin as an organ and calculation of its area by nomogram and formula Measures to prevent infection with viral hepatitis and human immunodeficiency virus (HIV) during the blood and other biological materials analysis Physiological assessment of parameters in complete blood count (red blood cells count, hematocrit, hemoglobin, color index and RBC indices, white blood cells count and leukocyte formula, platelet count,		
				Panchenkov's ESR method) Assessment of primary hemostasis indices (bandage test) Assessment of result of blood typing in ABO and Rh systems using standard sera and		

7.	Epithelial tissues: types, structure features, function. Glandular epithelium, secretion. Glands: types, peculiarities of structure, functions. Skin: peculiarities of structure, functions. Laboratory works: Studying the structure of epithelial tissues. Calculation of skin areas by Turovsky and body surface according to nomogram	3	–	monoclonal antibodies Description of morphological structures of skin as an organ and calculation of its area by nomogram and formula	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
8.	Chemical signaling. Morphofunctional organization of endocrine system, anatomy and physiology of hypothalamus, pituitary gland and epiphysis. Laboratory works: Studying the receptor mechanisms of perceptions of signal. Receptors and their types. Studying the general plan of human endocrine system. Studying the hormones of central endocrine organs, their impact on the cells, tissues, target organs for human. Human height evaluation. Evaluation of endocrine functions in example of cortisol and adrenocorticotrophic hormone levels in blood plasma.	3	–	Measurement of human height. Evaluation of endocrine system functions (height as index of endocrine axis hypothalamus-pituitary-liver).	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
9.	Special anatomy and physiology of endocrine system. Stress. Laboratory works: Analysis of catecholamine as hormones and neurotransmitters impact on cardiovascular system indexes.	3	–	Measurement of human height. Evaluation of endocrine system functions (endocrine axis hypothalamus-pituitary-adrenals).	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
10.	Male and female reproductive system. Laboratory works: Assessment of hand muscle strength in men and	3	–	Dynamometry conduction (manual and standing) in men and	Defense of laboratory works. Situation-problem	Electronic tests, interview, reports, theses, control

	women Study of the nature of crystallization of saliva Influence of female sex hormones on bone mineralization.				women and its comparison regarding the sex of a person and impact of sex hormones	solving.	works.
11.	Concluding lesson on the sections “Epithelial tissues: structure and functions. Blood. Skin. Human anatomy and physiology of endocrine system. Male and female reproductive system”.	3	–	Description of morphological structures of the human body (three types of epithelial tissues: their features) Measurement of human height. Evaluation of endocrine system functions (height as index of endocrine axis hypothalamus-pituitary-liver, endocrine axis hypothalamus-pituitary-adrenals) Dynamometry conduction (manual and standing) in men and women and its comparison regarding the sex of a person and impact of sex hormones		Colloquium	
12.	Electrical signaling. Laws of irritation of excitable tissues. Bioelectrical potentials. Changes of excitability during excitation. Laboratory works: Study of the effects of Na ⁺ ions and K ⁺ on resting membrane potential and action potential	3	–	Assessment of extracellular concentration of K ⁺ and Na ⁺ shifts on membrane potential values	Defense of laboratory works. Situation-problem solving.		Electronic tests, interview, reports, theses, control works.
13.	Nervous tissue: structure, properties. Excitation conduction in nervous fibers. Synaptic	3	–	Possibility of pharmacological effect	Defense of laboratory works.		Electronic tests, interview, reports,

	transmission Laboratory works: Comparison in structure of central synapse and neuro-muscular junction			on process of signal transmission in synapses (example of neuro-muscular junction)	Situation-problem solving.	theses, control works.
14.	Human anatomy and physiology of muscle tissues, its types. Skeletal, smooth muscle tissues: morphofunctional features (macro- and microstructure, contraction mechanism, regulation of activity) Laboratory works: Electromyography Dynamometry manual and standing	3	–	Dynamometry conduction (manual and standing) and physiological assessment of obtained data.	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
15.	General physiology of central nervous system. Reflexory theory. Nervous centers: its properties, principles on functioning. Excitation and inhibition in CNS, neurotransmitter mechanism Laboratory works: Studying the knee (tendon) reflex in human Studying the reciprocal inhibition of motor reaction with electromyography method	3	–	Study of the main tendon reflexes on the example of the knee reflex (morphological basis [reflex arc]). Physiological assessment of the obtained data	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
16.	Special anatomy and physiology of autonomic nervous system Laboratory works: Studying of the functional state of the centers regulating the heart (orthostatic reflex, clinostatic reflex, Goering's respiratory-cardiac reflex) Studying of neurotransmitter mechanisms of the influence of sympathetic and parasympathetic sections of the ANS on cardiac function	3	–	Assessment of tone and reactivity of sympathetic and parasympathetic parts of ANS by heart rate on the example of clinostatic and orthostatic reflexes	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
17.	Concluding lesson on the section "Anatomy and physiology of excitable (nervous and muscle) tissues. Special anatomy and physiology of autonomic nervous system"	3	–	Assessment of extracellular concentration of K ⁺ and Na ⁺ shifts on		Colloquium

	”			membrane potential values Possibility of pharmacological effect on process of signal transmission in synapses (example of neuro-muscular junction) Dynamometry conduction (manual and standing) and physiological assessment of obtained data. Study of the main tendon reflexes on the example of the knee reflex (morphological basis [reflex arc]). Physiological assessment of the obtained data Assessment of tone and reactivity of		
18.	Special anatomy and physiology of the central nervous system, its role in movement control. Somatic reflexes. CREDIT	3	–	sympathetic and parasympathetic parts of ANS by heart rate on the example of clinostatic and orthostatic reflexes Study of the main tendon reflexes on the example of the knee	Defense of laboratory works. Situation-problem	Electronic tests, interview, reports, theses, control

	Laboratory works: Studying of some myotatic reflexes of the spinal cord (lower jaws, flexor and extensor reflexes of upper limb) Studying of motor functions of some cranial nerves Studying of cerebellar control of motor activity				reflex (morphological basis [reflex arc]). Physiological assessment of the obtained data Comparison of mono- and polysynaptic reflexes.	solving.	works.
	2 semester						
	Lectures						
13.	Hemodynamics. Functional indexes of circulation. Regional circulation. Regulation of circulation. Structure and functions of lymphatic system	1,5					
14.	Anatomy and physiology of the respiratory system: lung ventilation, gas exchange in the lungs, blood gas transport, gas exchange in tissues	1,5					
15.	Structure and functions of the digestive system. Digestion in the mouth and stomach. Digestion in the small and large intestine. The role of the pancreas and liver in digestion. Absorption	1,5					
16.	Physiology of excretion	1,5					
17.	General physiology of sensory systems			1,5			Electronic tests, interview.
18.	Congenital and acquired forms of adaptive reactions of an organism to changes in the conditions of existence. Memory. Types of HNA			1,5			Electronic tests, interview.
	Laboratory classes						
19.	Structure, functions of heart and vessels. Hemodynamics. Functional indexes of circulation. Microcirculation Laboratory works: Determination of arterial blood pressure in human by Korotkov's method Studying the arterial pulse properties by palpation	3	–		Properties of arterial pulse and assessment of its rhythmicity and frequency by palpation method. Measurement of arterial pressure values.	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.

	method Analysis of sphymogrammm Usage of information test to detect latent hypertension				Physiological assessment of obtained data.		
20.	Physiological properties and features of myocardium. Cardiac cycle. Methods of cardiac activity investigation Laboratory works: Determination of the duration of the cardiac cycle in humans by pulse Registration and analysis of ECG Basics of phonocardiogram. Analysis of phonocardiogram	3	–		Assessment of cardiac cycle duration at rest based on ECG. Physiological assessment of obtained data.	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
21.	Regulation of heart work Laboratory works: Studying the influence of some substances on isolated frog's heart Functional tests of cardiovascular system reactivity	3	–		Assessment of tone and reactivity of sympathetic and parasympathetic parts of ANS by heart rate on the example of clinostatic and orthostatic reflexes	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
22.	Regulation of circulation Laboratory works: Analysis of receptor and ion mechanisms of blood pressure regulation and heart work Determination of a person's physiological capacity for work according to the PWC170 test Assessment of cardiovascular reactivity (postural (orthostatic reflex) baroreflex) Studying the functional system of arterial blood pressure regulation	3	–		Assessment of tone and reactivity of sympathetic and parasympathetic parts of ANS by heart rate on the example of clinostatic and orthostatic reflexes	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
23.	Structure and functions of respiration. Lung ventilation Laboratory works:	3	–		Spirometry: determination of vital capacity (VC), due vital capacity (V		

	Studying of lung ventilation: spirometry Studying of lung ventilation: spirometry Studying of lung ventilation: pneumotachometry			capacity (dVC), physiological assessment of obtained data. Assessment of spirogram. Pneumotachometry (peakflowmetry). Calculation of proper values. Physiological assessment of obtained data.	solving.	works.
24.	Gas exchange in tissues. Transport of gases by the blood Laboratory works: Studying the breath-holding impact on oxygen saturation Studying the different factors impact on pulseoxymetry	3	–	Pulseoxymetry conduction and physiologic assessment of hemoglobin oxygen saturation curve. Calculation of oxygen capacity of blood.	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
25.	Regulation of respiration Laboratory works: Respiratory muscle strength testing Studying of the effect of increasing CO ₂ tension in alveolar air on external respiration Studying the nervous connection between different parts of nervous center	3	–	Studying the three levels organization of respiration center: vital departments	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
	Studying the functional system of respiration regulation					
26.	Concluding class in topics “Anatomy and physiology of circulation and ventilation”	3	–	Spirometry: determination of vital capacity (VC), due vital capacity (dVC), physiological assessment of obtained data. Assessment of		

				spirogram. Pneumotachometry (peakflowmetry). Calculation of proper values. Physiological assessment of obtained data. Pulseoxymetry conduction and physiologic assessment of hemoglobin oxygen saturation curve. Calculation of oxygen capacity of blood. Studying the three levels organization of respiration center: vital departments		
27.	General characteristics of digestive system. Regulation of eating behavior. Digestion in the mouth and stomach Laboratory works: Assessment of the rate of mixed saliva secretion (sialometry) Studying of the action of α-amylase (ptialin) of saliva on starch	3	–	Sialometry conduction and physiological assessment of the obtained data	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
28.	Determination of oral fluid pH Digestion in the small and large intestine. The role of the pancreas and liver in digestion. Absorption Laboratory works: Studying the bile impact on fats Study of the influence of neurotransmitters of the sympathetic nervous system on the peristalsis of the small intestine and analysis of the	3	–	Assessment of bile impact on fats state.	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.

	neurotransmitter mechanisms of excitation conduction on the smooth muscles of the intestine					
29.	The metabolism of substances and energy. Physiological basis of healthy nutrition. Physiology of thermoregulation Laboratory works: Calculation of proper values of basic metabolic rate by tables and formulas Determination of basic metabolic rate values by indirect calorimetric method Body mass assessment Measurement and evaluation of human temperature Determination of the average temperature of the skin of the human body Studying the functional system maintaining the homeostasis of internal environment of a human	3	–	Measurement of body mass. Calculation of body mass index. Physiological assessment of the obtained data and formulation of scientifically based recommendations for the body weight correction. Measurement of axial body temperature using liquid and electronic thermometers; analysis of possible errors during performance. Physiological assessment of the obtained data.	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
30.	Physiology of excretion Laboratory works: Conduction analysis of urine by express method Studying some functions of the kidney on a model	3	–	Physiologic assessment of the composition and properties of terminal urine. Common urine analysis	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
31.	Concluding class in topics “Anatomy and physiology of digestive system. The metabolism of substances and energy. Physiological basics of healthy eating. Physiology of thermoregulation. Physiology of excretion”.	3	–	Sialometry conduction and physiological assessment of the obtained data Assessment of bile impact on fats state. Measurement of body		

				mass. Calculation of body mass index. Physiological assessment of the obtained data and formulation of scientifically based recommendations for the body weight correction. Measurement of axial body temperature using liquid and electronic thermometers: analysis of possible errors during performance. Physiological assessment of the obtained data. Physiologic assessment of the composition and properties of terminal urine. Common urine analysis		
32.	General principles of structure and function of sensory systems. Structure and functions of visual, auditory sensory systems Laboratory works: Determination of visual acuity Determination of the boundaries of the visual field (perimetry) Studying the color vision Determination of the sensitivity of the central regions of the retina	3	–	Assessment of visual system functions (investigation of visual acuity, perimetry, studying the color vision).	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.

33.	Special physiology of sensory systems. Structure and functions of auditory, vestibular, taste, olfactory and somatovisceral sensory systems. Nociception. Nociceptive and antinociceptive systems: structure, functions, mechanisms of functioning Laboratory works: Determination of the sound source direction Examination of bone and air conduction (tunnel audiometry (Weber and Rinne tests) Studying of the dependence of auditory sensitivity on sound frequency and sound pressure level (tonal audiometry) Studying of tactile sensitivity (measurement of spatial thresholds) Studying of sensitivity of the taste analyzer Analysis of the spatial summation of excitation in the central representation of the taste analyzer	3	–	Assessment of taste analyzer functions Assessment of auditory sensory system functions: experiments of Weber and Rinne.	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
34.	Innate and acquired adaptive reactions of the organism to changing environmental conditions. Laboratory works: Determination of associative memory volume Determination of a short-term auditory memory volume using letter and digit complexes in the human	3	–	Assessment of a short-term auditory memory volume using letter and digit complexes in the human. Assessment of attention indices using a correction test.	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses, control works.
35.	Determination of a short-term visual memory volume in humans Studying the higher nervous activity types by I.P. Pavlov	3	–	Assessment of attention indices using a correction test.	Defense of laboratory works. Situation-problem	Electronic tests, interview, reports, theses, control

Evaluation of the latent period of simple and complex sensorimotor reaction Determination of functional asymmetry of the hemispheres Assessment of attention parameters by means of a proofreading test Studying the functional system of acquired behavior					solving.	works.
Total	18	105	9			Exam