

AMENDMENTS AND CHANGES TO THE CURRICULUM IN THE EDUCATIONAL DISCIPLINE

«Human Anatomy and Physiology»
for the specialty 07-07-0912-01 «Pharmacy»
for 2026/2027 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 p. 2. Physiology : textbook / edited by V. M. Moroz, O. A. Shandra. – 2nd edition. – Vinnitsia: Nova Knyha, 2016. – 728 p.	Department meeting (protocol №20 of 14.05.2026)
Changes have been introduced into the Academic discipline curricular chart (appendix 1)	Department meeting (protocol №20 of 14.05.2026)
To establish a control work as a mandatory form of current assessment in the II semester on the topics: 1.«Epithelial tissues: structure and functions. Blood. Skin. Human anatomy and physiology of endocrine system. Male and female reproductive system» 2.«Anatomy and physiology of excitable (nervous and muscle) tissues. Special anatomy and physiology of autonomic nervous system». To establish a control work as a mandatory form of current assessment in the III semester on the topic: 1.«Anatomy and physiology of circulation. Anatomy and physiology of ventilation». 2.«Anatomy and physiology of digestive system. The metabolism of substances and energy. Physiological basics of healthy eating. Physiology of thermoregulation. Physiology of excretion».	Educational Plan for 2026/2027 academic year

Changes have been introduced into the List of Practical Skills (appendix 2)

Department meeting (protocol №20 of 14.05.2026)

The curriculum is revised and approved at the department meeting Normal physiology (protocol №20 of 14.05.2026)

Head of the Normal physiology department

I.N. Semenenya

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			Electronic tests, interview.
3.	Physiology of blood system	-	-	1,5			Electronic tests, interview.
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	-	-			

	Biological potentials. Changes of excitability during excitation					
7.	Structure and functions of peripheral nerves, conduction of excitation along them. Synaptic transmission	1,5	-	-		
8.	Muscle tissue: types, structure, functions. Skeletal and smooth muscles tissues.	1,5	-	-		
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		Electronic tests, interview.
	Laboratory classes					
1.	Introduction. The subject and tasks of human anatomy and physiology: history, contribution of domestic scientists. Biological basic of human life activity, cell theory. Laboratory works: Studying the receptor mechanism of adrenaline's effect on heart rate	3	-		Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.
2.	General concept of tissues. Connective tissues: types and functions. Human skeleton. Laboratory works: Studying the regulation mechanisms of calcium and phosphorus metabolism in the organism Studying the structure of human skeleton.	3	-		Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.
3.	Fluid media of the body. Physico-chemical properties of the blood	3	-		Defense of laboratory works.	Electronic tests, interview, reports,

	Laboratory works: Studying the different types of hemolysis Determination of the hematocrit				parameters in complete blood count (hematocrit)	Situation-problem solving.	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. Physiological evaluation of complete blood count result.	3	–		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)	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.
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	3	–			Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.
6.	Concluding lesson on the sections "The subject and tasks of anatomy and physiology. Tissues, their types. Connective tissues: structure, types, functions. Blood"	3	–		Description of morphological structures of the human organism (comparative characteristics of four types of tissues) Description of morphological structures of skin as an organ and calculation of its area by nomogram and formula		Colloquium, control works*.

				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)		
7.	Epithelial tissues: types, structure features, function. Glandular epithelium, secretion. Glands: types, peculiarities of structure, functions. Skin: peculiarities of structure, functions. Laboratory works: Calculation of skin areas by Turovsky and body surface according to nomogram	3	–	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.
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 hormones of central endocrine organs, their impact on the cells, tissues, target organs for human. Human height evaluation.	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.
9.	Special anatomy and physiology of endocrine system. Stress. Laboratory works: Analysis of catecholamine as hormones and neurotransmitters impact on cardiovascular system indexes.	3	–		Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.

10.	Male and female reproductive system. Laboratory works: Assessment of hand muscle strength in men and women Study of the nature of crystallization of saliva	3	–		Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.
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)		Colloquium, control works*
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	–		Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.
13.	Nervous tissue: structure, properties. Excitation conduction in nervous fibers. Synaptic transmission Laboratory works: Comparison in structure of central synapse and neuro-muscular junction	3	–		Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.
14.	Human anatomy and physiology of muscle tissues, its types. Skeletal, smooth muscle tissues:	3	–		Defense of laboratory works.	Electronic tests, interview, reports,

	morphofunctional features (macro- and microstructure, contraction mechanism, regulation of activity) Laboratory works: Electromyography Dynamometry manual and standing				Situation-problem solving.	theses.
15.	General physiology of central nervous system. Reflectory 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	–		Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.
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	–		Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.
17.	Concluding lesson on the section "Anatomy and physiology of excitable (nervous and muscle) tissues. Special anatomy and physiology of autonomic nervous system"	3	–			Colloquium, control works
18.	Special anatomy and physiology of the central nervous system, its role in movement control. Somatic reflexes. CREDIT Laboratory works: Studying of some myotatic reflexes of the spinal cord (lower jaws, flexor and extensor reflexes of upper limb)	3	–		Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.

	Studying of motor functions of some cranial nerves					
	Studying of cerebellar control of motor activity					
	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 method	3	–	Properties of arterial pulse and assessment of its rhythmicity and frequency by palpation method. Measurement of arterial pressure values. Physiological assessment of obtained data.	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.
20.	Physiological properties and features of myocardium. Cardiac cycle. Methods of cardiac	3	–		Defense of laboratory works.	Electronic tests, interview, reports,

	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				Situation-problem solving.	theses.
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	–		Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.
22.	Regulation of circulation Laboratory works: Analysis of receptor and ion mechanisms of blood pressure regulation and heart work Assessment of cardiovascular reactivity (postural (orthostatic reflex) baroreflex)	3	–		Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.
23.	Structure and functions of respiration. Lung ventilation Laboratory works: Studying of lung ventilation: spirometry Studying of lung ventilation: spirometry Studying of lung ventilation: pneumotachometry	3	–		Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.
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.
25.	Regulation of respiration Laboratory works:	3	–		Defense of laboratory works.	Electronic tests, interview, reports,

	Respiratory muscle strength testing Studying the nervous connection between different parts of nervous center Studying the functional system of respiration regulation				Situation-problem solving.	theses.
26.	Concluding class in topics “Anatomy and physiology of circulation. Anatomy and physiology of ventilation”	3	–	Properties of arterial pulse and assessment of its rhythmicity and frequency by palpation method. Measurement of arterial pressure values. Physiological assessment of obtained data. Pulseoxymetry conduction and physiologic assessment of hemoglobin oxygen saturation curve. Calculation of oxygen capacity of blood.		Colloquium, control works
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 Determination of oral fluid pH	3	–		Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.
28.	Digestion in the small and large intestine. The role of the pancreas and liver in digestion. Absorption	3	–		Defense of laboratory works.	Electronic tests, interview, reports,

	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 neurotransmitter mechanisms of excitation conduction on the smooth muscles of the intestine				Situation-problem solving.	theses.
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 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.
30.	Physiology of excretion Laboratory works: Conduction analysis of urine by express method	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.
31.	Concluding class in topics “Anatomy and physiology of digestive system. The metabolism	3	–	Measurement of body mass. Calculation of		

	of substances and energy. Physiological basics of healthy eating. Physiology of thermoregulation. Physiology of excretion”.			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	–		Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.

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	3	–		Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.
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 Determination of a short-term visual memory volume in humans Studying the higher nervous activity types by I.P. Pavlov	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.
35.	Higher integrative functions of the brain as the physiological basis of human mental functions Laboratory works: Evaluation of the latent period of simple and complex sensorimotor reaction Determination of functional asymmetry of the	3	–	Assessment of attention indices using a correction test.	Defense of laboratory works. Situation-problem solving.	Electronic tests, interview, reports, theses.

hemispheres						
Assessment of attention parameters by means of a proofreading test						
Studying the functional system of acquired behavior						
Total	18	105	9			Exam

* - mandatory form of current assessment

LIST OF PRACTICAL SKILLS
IN EDUCATIONAL DISCIPLINE HUMAN ANATOMY AND PHYSIOLOGY
FOR SPECIALTY PHARMACY

№	Name of practical skill	Form of control of practical skill
1.	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.
2.	Physiological assessment of parameters in complete blood count obtained by using manual and semi-automatic methods of counting (red blood cells count, hematocrit, hemoglobin, color index and RBC indices, white blood cells count and leukocyte formula, platelet count)	Defense of laboratory works. Situation-problem solving.
3.	Measurement of human height. Evaluation of endocrine system functions (height as index of endocrine axis hypothalamus-pituitary-liver, endocrine axis hypothalamus-pituitary-adrenals)	Defense of laboratory works. Situation-problem solving.
4.	Properties of arterial pulse and assessment of its rhythmicity and frequency by palpation method.	Defense of laboratory works. Situation-problem solving.
5.	Measurement of arterial pressure values. Physiological assessment of obtained data.	Defense of laboratory works. Situation-problem solving.
6.	Pulseoxymetry conduction and physiologic assessment of hemoglobin oxygen saturation curve. Calculation of oxygen capacity of blood.	Defense of laboratory works. Situation-problem solving.
7.	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.	Defense of laboratory works. Situation-problem solving.
8.	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.
9.	Physiologic assessment of the composition and properties of terminal urine. Common urine analysis.	Defense of laboratory works. Situation-problem solving.