

TARAS SHEVCHENKO NATIONAL UNIVERSITY OF KYIV
EDUCATIONAL AND SCIENTIFIC CENTER "INSTITUTE OF BIOLOGY AND MEDICINE"
DEPARTMENT OF PHYSIOLOGY AND ANATOMY



"APPROVED"

Deputy director for scientific
and pedagogical work
Olga KHARCHENKO

2026

WORKING PROGRAM ON THE DISCIPLINE

PHYSIOLOGY

for higher education applicants

Branch of knowledge 22 «Healthcare»

Specialty 222 «Medicine»

Educational level «Master »

Educational program «Medicine»

Type of discipline obligatory

Form of study daytime
Academic year 2024/2025
Semester 3,4
Amount of credits ECTS 9
Language of teaching,
Learning and ratings English
Form of final control credit, examination test

Teachers: PhD., Assistant professor Evdokiya RESHETNIK; PhD., assistant Olga PODPALOVA

Prolonged: in 20__/20__ h.p. _____ (_____) «____» 20__ p.
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KYIV – 2026

Developers:

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APPROVED

Head of the Department of
Physiology and Anatomy



(Oleksandr KOVALCHUK)

Protocol № 20 from «03» 06 2026

*Considered by scientific and methodical commission
of Educational and Scientific Center "Institute of Biology and Medicine"
of Taras Shevchenko National University of Kyiv.*

Protocol № 9, «23» 06 2026

Head of Scientific and Methodical Commission



(Tetyana SHEVCHENKO)

«24» 06 2026

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Protocol № _____, «____» _____20__

Head of Scientific and Methodical Commission _____(Tetyana SHEVCHENKO)

«_____» _____20__

1. The purpose of the discipline is acquiring by each student general knowledge about the laws of organization and functioning of the systems human organism and mechanisms of their interaction.

2. Preliminary requirements for mastering or choosing a discipline:

Proper knowledge of the structure of the human body, the microscopic organization of tissues and cells, as well as the development of the embryo. Understanding of chemical and biophysical processes occurring in a living organism, and mastery of the basics of international medical terminology. The ability to independently integrate and apply fundamental natural and structural-functional knowledge in practical activities, as well as effectively search and analyze scientific and methodological sources.

Have the elementary skills of basic system analysis.

3. Annotation of the discipline:

Discipline "Physiology" is a part of the program of professional training of specialists of educational level "Master" of the branch of knowledge 22 "Health care" of specialty 222 "Medicine" of the educational qualification level "Master of Medicine" of professional qualification "doctor", which involves the acquisition of knowledge by students the regularities of evolution, structural organization and functioning of physiological systems of the human body and the mechanisms of functional connections between them. Knowledge obtained from the discipline "Physiology" is the basement of formation the skills, which can be applied in the field of clinical medicine to substantiate the clinical diagnosis, explain the features of the course of pathological processes, the solution of diagnostic, therapeutic and surgical tasks and in other sciences (pharmacology, hygiene et al.).

The subject of the study of the discipline "Physiology" is the functioning of the human body, its organs and systems, as well as the principles and methods of its investigation. Organization of study process is carried out in accordance to the credit transfer system under the requirements of the Bologna process. For the educational component, a level 2 use of generative artificial intelligence is generally established according to the “Regulations on the use of artificial intelligence in the implementation of educational programs at Taras Shevchenko National University of Kyiv”

4. The main tasks of studying the discipline:

1. formation of knowledge of physiological mechanisms of functioning of organs and systems of the human body;
2. the ability to interpret physiological indices from the standpoint of norm and pathology; formation of the ability to choose the most rational methods of physiological research;
3. formation of skills to apply knowledge of physiology to substantiate the diagnosis and understanding of the pathogenesis of various pathological processes;

In accordance with the requirements of the Standard on Higher Education of Ukraine (second (master's) level of higher education (seventh level of National Qualifications Framework of Ukraine), field of knowledge I "Health care", specialty I2 "Medicine"), the discipline ensures that students acquire the following competencies:

integral:

ability to solve complex tasks and problems in the field of health care and on studying process which involves conducting research and/or realization of innovations and is characterized by uncertainty of conditions and requirements;

general:

GC 2. The ability to learn and master modern knowledge.

GC 4. Knowledge and understanding of the subject field and understanding of professional activity. GC 7.

Ability to work in a team.

GC 9. Ability to communicate in a foreign language.

GC 10. Ability to use information and communication technologies.

GC 11. Ability to search and process and analyze information from various sources.

special (professional, subject):

SC 17. The ability to assess the impact of the environment, socio-economic and biological determinants on the state of health of an individual, family, community.

SK 21. Clearly and unambiguously convey one's own knowledge, conclusions and arguments on health care problems and related issues to specialists and non-specialists, in particular to people who are studying.

SC 24. Compliance with ethical principles when working with patients and laboratory animals.

5. Results of studying in a discipline (semester 3):

Learning outcomes (1. know; 2. able; 3. communication; 4. autonomy and responsibility);		Forms (and/or methods and technologies) of teaching and learning	Methods of assessment	Percentage in the final assessment of the discipline
Code	Results of studying			
1	Know			
1.1.	subject and tasks of physiology, methods of physiological research, functions of the cell membrane, types of transport of substances through cell membranes	Lecture, laboratory lesson, independent work	Module control 1, assessment of oral and written answers/MCQ	5
1.2.	mechanisms of the development of resting potential and action potential in nerve and muscle fibers and interpret their parameters	Lecture, laboratory lesson, independent work	Module control 1; assessment of oral and written answers/MCQ	5
1.3.	mechanisms of information transmission in CNS synapses, the role of neurotransmitters and neuromodulators; mechanisms of development of excitation and inhibition and their role in the integrative function of the central nervous system	Lecture, laboratory lesson, independent work	Module control 2; assessment of oral and written answers/MCQ	5
1.4.	the organization of motor systems of the body, which unite the structures of different levels of the central nervous system; mechanisms of integrative activity underlying consciousness and sleep	Lecture, laboratory lesson, independent work	Module control 2; assessment of oral and written answers/MCQ	5
1.5.	mechanisms of influence of the autonomic nervous system on the visceral functions of the body	Lecture, laboratory lesson, independent work	Module control 3; assessment of oral and written answers/MCQ	5
1.6.	mechanisms of hormonal control: mechanisms of homeostatic control; non-specific reaction to the body's adaptation; linear body growth, physical, mental and sexual development	Lecture, laboratory lesson, independent work	Module control 3; assessment of oral and written answers/MCQ	5
1.7.	functions of the sensory system, its structural elements and supporting structures based on criteria differentiated for each sensory system	Lecture, laboratory lesson, independent work	Module control 4; assessment of oral and written answers/MCQ	5

1.8.	the mechanisms of the emergence of biological needs and motivations, learning, memory and specify their meaning and role in the formation of various inherited and acquired forms of behavior	Lecture, laboratory lesson, independent work	Module control 4; assessment of oral and written answers/MCQ	5
2	Able			
2.1.	interpret the mechanisms of blockade of the neuromuscular conduction of excitation, explain the role of factors on which the force of muscle contraction depends	Lecture, laboratory lesson, independent work	Module control 1; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills	5
2.2.	to analyze the principles of reflex coordination while ensuring adaptive reactions of the body: schematically depict various reflex arcs	Lecture, laboratory lesson, independent work	Module control 2; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills	6
2.3.	draw conclusions about the state of the pathways of the central nervous system, evaluate their role in providing sensory and motor functions; analysis of normal human EEG	Lecture, laboratory lesson, independent work	Module control 2; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills	6
2.4.	analyze changes in visceral functions upon activation of the sympathetic or parasympathetic nervous system; schematically draw autonomic reflex arcs	Lecture, laboratory lesson, independent work	Module control 3; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills	6
2.5.	analyze the regulated parameters and draw conclusions about the state of the regulatory hormonal mechanisms of the development of the linear growth of the body	Lecture, laboratory lesson, independent work	Module control 3; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills	6
2.6.	analyze regulated parameters and draw conclusions about the function of homeostatic control of hormones	Lecture, laboratory lesson, independent work	Module control 3; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills	5
2.7.	explain the physiological basis of research methods for each of the sensory systems, evaluate visual and auditory acuity	Lecture, laboratory lesson, independent work	Module control 4; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills	6

2.8.	explain the physiological basis of the formation of conditioned reflexes; evaluate basic cognitive functions	Lecture, laboratory lesson, independent work	Module control 4; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills	5
3	Communication			
3.1.	Communicate with colleagues and the audience both orally and in writing; to provide a professional scientific discussion on physiology	Laboratory lesson, independent work	Evaluation of oral answers	5
3.2.	Demonstrate skills in written explanation and presentation of own research results	Laboratory lesson, independent work	Evaluation of an oral report/presentation of modern problems in physiology	5
4	Autonomy and responsibility			
4.1.	Orientate yourself in key issues of human physiology; carry out the selection and analysis of modern literature in a given scientific direction, have the skills to analyze primary data and plan one's own physiological research works.	Independent work	Evaluation of an oral report/presentation of modern problems in physiology	5

Results of studying in a discipline (semester 4):

Learning outcomes (1. know; 2. able; 3. communication; 4. autonomy and responsibility);		Forms (and / or methods and technologies) of teaching and learning	Methods of assessment	Percentage in the final assessment of the discipline
Code	Results of studying			
1	Know			
1.1.	The concept of the blood system, the mechanisms of its regulation, based on the analysis of homeostasis parameters: blood volume, acid-base balance, osmotic pressure, quantitative and qualitative composition of plasma and formed blood elements	Lecture, laboratory lesson, independent work	Module control 1, assessment of oral and written answers/MCQ; exam	5
1.2.	The concept of the circulatory system. Physiological properties of heart muscle	Lecture, laboratory lesson, independent work	Module control 2, assessment of oral and written answers/MCQ; exam	5
1.3.	Basic mechanisms of the heart and regulation of cardiac activity	Lecture, laboratory lesson, independent work	Module control 2, assessment of oral and written answers/MCQ; exam	5
1.4.	The role of blood vessels in the circulatory system. Basic principles of blood circulation	Lecture, laboratory lesson, independent work	Module control 2, assessment of oral and written answers/MCQ; exam	5
1.5.	Mechanisms of blood flow regulation by vessels. Regulation of systemic blood circulation	Lecture, laboratory lesson, independent work	Module control 2, assessment of oral and written answers/MCQ; exam	5
1.6.	The main parts of the respiratory system and the mechanisms of gas regulation homeostasis based on the analysis of physiological criteria of the functions of executive structures of the system that ensure breathing processes	Lecture, laboratory lesson, independent work	Module control 3, assessment of oral and written answers/MCQ; exam	5
1.7.	General concepts of metabolism in the body, mechanisms of regulating the intensity of metabolism, plastic and energetic role of nutrients	Lecture, laboratory lesson, independent work	Module control 3, assessment of oral and written answers/MCQ; exam	5
1.8.	Nervous and humoral mechanisms of thermoregulation, temperature regulation of the body during changes in the temperature of the external environment	Lecture, laboratory lesson, independent work	Module control 3, assessment of oral and written answers/MCQ; exam	5
1.9.	The main departments of the digestive system and the mechanisms of regulation of its physiological functions (secretory, motor, absorption of nutrients)	Lecture, laboratory lesson, independent work	Module control 4, assessment of oral and written answers/MCQ; exam	5
1.10.	Functions of the urinary system, mechanisms of homeostasis regulation with its participation based on the analysis of homeostasis constants: circulating blood volume, ion concentration, osmotic pressure, acid-base balance	Lecture, laboratory lesson, independent work	Module control 4, assessment of oral and written answers/MCQ; exam	5

2	Able			
2.1.	Evaluate quantitative and qualitative indicators of blood: hematocrit index, number of erythrocytes, hemoglobin, leukocytes, platelets, leukocyte formula, color index, erythrocyte sedimentation rate, blood coagulation time, bleeding time	Lecture, laboratory lesson, independent work	Module control 1; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills; exam	5
2.2.	Analyze regulated parameters characterizing the functional state of the heart, draw conclusions about the mechanisms of regulation of heart functions	Lecture, laboratory lesson, independent work	Module control 2; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills; exam	5
2.3.	To explain the physiological basis of the methods of research of the circulatory system: ECG, PCG, sphygmography, etc., to analyze the age-specific features of the functional parameters of the human circulatory system	Lecture, laboratory lesson, independent work	Module control 2; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills; exam	5
2.4.	To analyze the main mechanisms of regulation of systemic and local hemodynamics	Lecture, laboratory lesson, independent work	Module control 2; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills; exam	5
2.5.	Analyze regulated parameters characterizing the state of gas exchange and draw conclusions about the mechanisms of regulation of the human breathing process in different conditions	Lecture, laboratory lesson, independent work	Module control 3; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills; exam	5
2.6.	Analyze age-related changes in energy expenditure and their regulation, explain the physiological basis of direct and indirect calorimetry methods	Lecture, laboratory lesson, independent work	Module control 3; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills; exam	5
2.7.	Explain the physiological basis of thermoregulation research methods: thermometry, thermography, sweating, infrared radiation, analyze the age-related features of human thermoregulation and its regulation	Lecture, laboratory lesson, independent work	Module control 3; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills; exam	5
2.8.	Formulate conclusions about the state of digestive processes in each part of the alimentary canal based on the analysis of the state of secretory, motor, absorptive functions and their regulation	Lecture, laboratory lesson, independent work	Module control 4; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills; exam	5
2.9.	Explain the physiological basis of the methods of studying the excretory function of the kidneys, analyze the state of the urinary system in humans	Lecture, laboratory lesson, independent work	Module control 4; assessment of oral and written answers/MCQ; demonstration of acquisition of practical skills; exam	5
3	Communication			
3.1.	Communicate with colleagues and the audience orally and in writing; to provide a professional scientific discussion on physiology	Laboratory lesson, independent work	Evaluation of oral answers	1

3.2.	Demonstrate skills in written explanation and presentation of own research findings	Laboratory lesson, independent work	Evaluation of an oral report/presentation of modern problems in physiology	1
4	Autonomy and responsibility			
4.1.	Orientate yourself in key issues of human physiology; carry out the selection and analysis of modern literature in a given scientific direction, have the skills to analyze primary data and plan one's own physiological research works.	Independent work	Evaluation of an oral report/presentation of modern problems in physiology	3

6. The ratio of the results of discipline study with program learning results (semester 3)

[illegible]

7. Scheme of estimation formation (semester 3)

7.1. Forms of student assessment:

- semester assessment:

1. Module control work 1– LR 1.1, 1.2; 2.1 (block of themes of Section 1)

– 10 points / 5 points;

The use of generative artificial intelligence is not permitted.

2. Module control work 2– LR 1.3, 1.4; 2.2, 2.3 (block of themes of Section 2)

– 10 points / 5 points;

The use of generative artificial intelligence is not permitted.

3. Module control work 3– LR 1.5,1.6; 2.4-2.6 (block of themes of Section 3)

– 10 points / 5 points;

The use of generative artificial intelligence is not permitted.

4. Module control work 4– LR 1.7,1.8; 2.7,2.8 (block of themes of Section 4)

– 10 points / 5 points;

The use of generative artificial intelligence is not permitted.

5. Test score in 6 lectures – LR 1.1. – 1.2. – 1.7

– 1 points / 0,5 points

6. Assessment in 18 laboratory classes - LR 1.1. – 1.1. – 1.8; 2.1. – 2.8; 3.1,3.2; 4.1.

– 3 points / 1,5 points

- final assessment: in the form of a credit

The final score from the educational component, the final form of control for which the count is set, is defined as the sum of marks (scores) for all successfully evaluated learning outcomes. Scores below the minimum threshold are not added to the final score.

Mandatory for a positive final score (60 points and above and "credited") is the completion of all practical lessons.

It is not allowed to complete the semester control in order to improve the positive assessment.

7.2. Organization of assessment:

Module control works 1, 2, 3, 4 are carried out after the completion of laboratory lessons from Sections 1, 2, 3, 4, respectively.

The assessment of oral answers, the execution and design of practical works is carried out during the semester in laboratory lessons and is included in the assessment of Module control work.

7.3. Validity Scale

Passed	60-100
Fail	0-59

Scheme of estimation formation (semester 4)

7.1. Forms of student assessment during semester:

- semester assessment:

1. Module control work 1 – LR 1.1; 2.1. (block of themes of Section 1)

– 7 points / 3,5 points;

The use of generative artificial intelligence is not permitted.

2. Module control work 2 – LR 1.2-1,5; 2.2-2.4. (block of themes of Section 2)

– 7 points / 3,5 points;

The use of generative artificial intelligence is not permitted.

3. Module control work 3 – LR 1.6-1.8; 2.5- 2.7. (block of themes of Section 3)

– 7 points / 3,5 points;

The use of generative artificial intelligence is not permitted.

4. Module control work 4 – LR 1.9-1.10; 2.8- 2.9. (block of themes of Section 4)

– 7 points / 3,5 points;

The use of generative artificial intelligence is not permitted.

5. Assessment in 16 laboratory classes - LR 1.1. – 1.10; 2.1. – 2.9; 3.1,3.2; 4.1.

– 2 points / 1 points;

6. Exam – LR 1.1-4.1. (themes of all sections) –40 points/ 24 points.

- final assessment: in the form of a examination test

The form of the final control of learning success after the completion of the semester 4 is a computer-based final test (exam questions). The maximum number of points that can be obtained by a student at the final test is 40 points. The results of the learning, which are evaluated in the test control work, are LR 1.1-4.1.

- admission conditions for the final exam:

Required for examination is the successful delivery of 3 modules and oral reports; for each modular work and oral reports, not less than 50% of the correct answers are needed. Students are not allowed to take an exam if their score less than 20 points during the semester.

7.2. Organization of assessment:

Module control works 5 - 8 are carried out after the completion of lectures from sections 5, 6, 7 and 8 respectively and the execution and design of practical works are carried out during the semester in practical lessons.

7.3. Validity Scale

Excellent	90-100
Good	75-89
Satisfactory	60-74
Fail	0-59

8. Structure of the discipline. Thematic plan* (semester 3)

№	Title of the topic	Number of hours			
		Lectures	Laboratory lessons	Consultations	Independent work*
1	Section 1. “Physiology of excitable tissues.”	4	12		18
2	Lecture 1. Subject and tasks of physiology. Physiology of cell membrane. Bioelectrical phenomena in the living matter	2			
3	Laboratory lesson 1. Subject and tasks of physiology. Methods of physiological researches. Functions of cell membrane. Types of transport across cell membrane.		3		
4	Independent work. Basic stages of development of physiology. History of the development of physiology in the nineteenth century. Contribution of works by I.M.Sechenov, I.P. Pavlov, P.K.Anokhin, P.G.Kostyuk in the development of world physiology. Ukrainian Physiology School.				9
5	Lecture 2. Transmission of nerve impulse through neuro-muscular junction. Mechanism of muscle contraction	2			
6	Laboratory lesson 2. Registration of the resting potential and action potential of excitable tissues		3		
7	Laboratory lesson 3. Studying the spread of excitation along the nerves. Studying the nerve impulse transmission through nervous-muscular junction.		3		
8	Independent work. Properties of smooth muscles, mechanisms of their contraction and relaxation. Features of contraction and relaxation of smooth muscles. Myogenic regulation of the force of contraction of smooth muscles. The role of calcium ions and calmodulin in the regulation of the force of contraction, the source of calcium ions. Regulation of force of contraction of visceral muscles of hollow organs, digestive canal.				9
9	Laboratory lesson 4. Studying the mechanism of muscle contraction. Studying of the single and tetanic curves of muscle contraction. Determination of the force of muscle contraction. Module control 1		3		
10	Section 2. “Main principles of biological regulation, nervous regulation of motor functions of an organism, high cerebral functions and processes”.	6	18		22

11	Lecture 3. Nervous regulation of body functions. Properties of synapses. Excitation and inhibition in the CNS. The concept of reflex activity	2			
12	Laboratory lesson 5. Studying of properties of central synapses. Studying of the inhibition processes of the central nervous system		3		
	Independent work. Neurotransmitter substances (acetylcholine, norepinephrine, dopamine, serotonin, glycine, glutamate, NO, etc.) and neuromodulators				6
13	Laboratory lesson 6. The general characteristic of biological regulation. Studying of reflex arch.		3		
14	Independent work. Role of feedback in control circuits of biological regulation. Examples of positive feedback in physiological systems.				5
15	Lecture 4. Role of spinal cord and brain stem in moving function regulation	2			
16	Laboratory lesson 7. Studying of spinal cord's role in motor functions regulation of an organism		3		
17	Laboratory lesson 8. Studying of the role of brain stem in motor functions regulation		3		
18	Independent work. The role of the spinal cord in the regulation of motor functions. The role of the brainstem in the regulation of motor functions.				6
19	Lecture 5. Role of cerebellum and prosencephalon in moving function regulation and homeostasis support of an organism	2			
20	Laboratory lesson 9. Studying the functions of cerebellum. Studying the role of prosencephalon in moving function regulation and homeostasis support of an organism		3		
21	Laboratory lesson 10. Studying the functions of cerebral cortex. Studying of electroencephalography. Physiology of sleep. Module control 2		3		
22	Independent work. The role of the forebrain and cerebellum in the regulation of motor functions of the body. Functions of cerebral cortex. Electroencephalography. Physiology of sleep. The regulation of systemic activity of the organism. Practical skills in physiology of excitatory structures and nervous system regulation of body functions				5
23	Section 3. "Nervous and humoral regulation of the visceral functions of an organism".	6	15		18
24	Lecture 6. Physiology of autonomic nervous system	2			
25	Independent work. "Alarm" or "Stress" response of the sympathetic nervous system. Pharmacology of autonomic nervous system				6

26	Laboratory lesson 11. Studying the mechanisms of nervous regulation of visceral functions of an organism		3		
27	Lecture 7. Humoral regulation of the visceral functions. Endocrine gland's role in growth, mental and sexual development regulation	2			
28	Laboratory lesson 12. Studying of humoral regulation of visceral functions of an organism		3		
29	Laboratory lesson 13. Studying the role of the hypothalamo-pituitary system in the control of endocrine glands function. Studying the role of hormones on growth and mental development		3		
30	Independent work. Main mechanisms of hormone action on the target cells. membrane and intracellular receptors, G-proteins, second messengers and their role. Testicular endocrinal function and its regulation. Hypothalamic- pituitary regulation loop of testicular hormones secretion. Hormonal and nervous ways of erection and ejaculation regulation.				6
31	Lecture 8. Endocrine gland's role in homeostasis regulation and unspecific adaptation of an organism	2			
32	Laboratory lesson 14. Studying the role of hormones in the regulation of glucose and calcium metabolism		3		
33	Laboratory lesson 15. Studying the role of hormones in homeostasis regulation and organism's adaptation to stressful factors and sexual development. Module control 3		3		
34	Independent work. Role of calcitonin, parathormone and calcitriol in the maintenance of calcium and phosphate blood concentrations. Influence of other hormones on calcium metabolism (glucocorticoids, somatotropin, insulin-like growth factors I, thyroid hormones, estrogen, insulin).				6
35	Section 4. "Physiology of sensory systems. Physiological bases of behavior. Physiological bases of human higher nervous activity".	4	9		18
36	Lecture 9. Physiology of senses	2			
37	Laboratory lesson 16. Studying of the somato-sensory system. Studying of the taste and smell sensation		3		
38	Laboratory lesson 17. Studying the auditory and visual sensory system		3		
39	Independent work. General characteristics of sensory systems. Somatosensory system. Physiological bases of pain and anesthesia. Visual system. Auditory system. Vestibular system. Taste system. Olfactory system				9
40	Lecture 10. The higher integrative functions of nervous system. Physiological bases of innate and acquired behavior. Physiological bases of memory	2			

41	Laboratory lesson 18. Studying the physiological base of behavior. Studying the mechanisms of memory, physiological bases of emotions, and types of human higher nervous activity. Module control 4		3		
42	Independent work. Types of higher nervous activity, their classification, physiological basics, research methods. Biological rhythms and their physiological role. The first and the second signaling systems. Speech and its functions. Modern view on speech production and brain function in communication. Brain cortex functional asymmetry, concept of dominant/non-dominant hemispheres and their interactions.				10
43	Total	20	54		76

Total volume 150 hours, including:

Lectures – 20 hours

Laboratory lessons – 54 hours

Independent work– 76 hours

Structure of the discipline. Thematic plan * (semester 4)

	Title of the topic	Number of hours			
		Lectures	Practical lessons	Consultations	Independent work [*]
1	Section 1. “Physiology of blood”	4	12		16
2	Lecture 1. The system of blood. Physical and chemical properties of blood. Physiology of erythrocytes. Blood groups	2			
3	Laboratory lesson 1. The system of blood. Studying of physics-chemical properties of blood		3		
4	Laboratory lesson 2. Studying of quantity of erythrocytes and hemoglobin in blood. Blood types.		3		
5	Independent work. Blood formation. Anemia and polycythemia. The body fluid compartments: extracellular and intracellular fluids; interstitial fluid and edema; determination of volumes of specific body fluid compartments; oncotic pressure and albumin/globulin rate; classification of plasma proteins.				8
6	Lecture 2. Hemostasis. Physiology of thrombocytes. Anticoagulant activity of blood. Defensive function of blood. Immunity	2			
7	Laboratory lesson 3. Studying the mechanisms of hemostasis		3		

8	Laboratory lesson 4. Blood types. Defensive functions of blood. Physiology of leukocytes. Module 1		3		
9	Independent work. Allergy. Transfusion. Tissue and organ transplantation. Leukemia and leukopenia. Interaction between innate and acquired immunities				8
10	Section 2. “The system of blood circulation”	2	15		16
11	Lecture 3. Physiological properties of cardiac muscle. Conductive system of the heart, electrical properties of myocardium. Pumping function of the heart, cardiac cycle. Methods of the heart examination, electrocardiography. Regulation of the heart activity. Role of blood vessels in blood circulation. Basic principles of hemodynamics. Regulation of blood flow in vasculature.	2			
12	Laboratory lesson 5. Studying of physiological properties of cardiac muscle and conduction of excitation by conductive system of the heart		3		
13	Laboratory lesson 6. Studying of the pumping function of the heart. Cardiac cycle.		3		
14	Independent work. Vectorocardiography. Heart failure				6
15	Laboratory lesson 7. Methods of the heart examination. Registration and analysis of electrocardiogram		3		
16	Laboratory lesson 8. Studying of the regulation of heart activity.		3		
17	Independent work. Muscle blood flow and cardiac output during exercise; the coronary circulation and ischemic heart disease. Hormone regulation of heart activity				4
18	Laboratory lesson 9. Examination of arterial pressure and arterial pulse in a human. Studying of the mechanisms of microcirculation. Module 2		3		
19	Independent work. The microcirculation and the lymphatic system: capillary fluid exchange, interstitial fluid, and lymph flow				6
20	Section 3. “Respiratory system. Energy exchange. Thermoregulation”	4	12		12
21	Lecture 4. Mechanisms of external respiration. Gas exchange and transport in the blood. Regulation of the respiration.	2			
22	Laboratory lesson 10. Studying of mechanisms of external respiration		3		
23	Laboratory lesson 11. Studying of gas diffusion in the lungs and gas transport in the blood		3		
24	Independent work. Significance of flashing epithelium. The relationship between pulmonary circulation and lung ventilation. Pulmonary Edema,				4
25	Laboratory lesson 12. Studying of mechanisms of the regulation of the respiration		3		
26	Independent work. Regulation of respiration during exercise, with elevated and lowered barometric pressure. Regulation of the first breath of a newborn. Respiration in the age aspect				4

27	Lecture 5. Physiology of energy metabolism and thermoregulation	2			
28	Laboratory lesson 13. Studying of metabolic rate and mechanisms of thermoregulation. Module 3		3		
29	Independent work. Physiological norms of nutrition. The proteins, fats, carbohydrates norms relative to age, types of labor and body condition (pregnancy, lactation period, etc.). Physiological bases of quenching. Age and sex characteristics of thermoregulation.				4
30	Section 4. “Digestive system. Urinary system. Physiology of physical activity”.	4	9		13
31	Lecture 6. Digestive system. Digestion in oral cavity and stomach Digestion in bowels. Physiological bases of hunger and saturation.	2			
32	Laboratory lesson 14. Studying of digestion in oral cavity and stomach		3		
33	Independent work. Physiological bases of methods of investigation of functions of the digestive canal.				4
34	Lecture 15. Digestion in the intestines. Physiological bases of hunger and saturation.		3		
35	Independent work. Physiological bases of modern methods of research of secretory, motor, absorption functions of the digestive system				4
36	Lecture 7. Mechanisms of urine formation. Regulation of urine formation and excretion. Role of kidneys in homeostasis maintenance	2			
37	Laboratory lesson 16. Studying of mechanisms of urine formation. Studying of kidney's participation in the homeostasis maintenance. Module 4		3		
38	Independent work. Mechanisms for Control of Blood Volume and Extracellular Fluid Volume. Regulation of Acid-Base Balance. Physiological bases of the methods of studying the function of the kidneys. Age-related changes in urine formation and urination.				5
39	Consultations “Physiology of visceral system”.			1	
40	Total	14	48	1	57

Total volume 120 hours, including:

Lectures – 14 hours

Laboratory lessons – 48 hours

Consultations – 1 hour

Independent work – 57 hours

Recommended literature:

1. Physiology / Moroz V.M., O.A. Shandra et al // "Nova Knyha". – 2018, P. 722
2. Textbook of medical physiology. Arthur C. Guyton, John E. Hall, 11th ed. 2006. – 1116 p.
3. Human physiology / Фізіологія людини / В. Є. Шех // Харків. – 2013, P. 627
4. Kurovska V.O., Podpalova O.M. Physiology: workbook for students studying the educational program "Medicine". Part 1. Kyiv University Publishing and Printing Centre, 2020, P. 203

Informational sources

Additional literature

1. Chernykh Maria, Podpalova Olga, Kravchenko Victoria, Reshetnik Evdokia, Kaminsky Rostyslav, Kovalchuk Oleksandr, Chelpanova I.V. "Neurodynamic correlates of chronic war-related stress: evidence of cognitive and emotional vulnerability in women and men" Wiadomości Lekarskie, (WLE-01611-2025-01) 2026. 79(5), 1012-1022.
2. Regulations on the use of artificial intelligence in the implementation of educational programs at the Taras Shevchenko National University of Kyiv
https://biomed.knu.ua/images/stories/NMK/Documents/Baza_vnutrishnih_doc/2026/Polozhennia_pro_AI_compressed.pdf
https://biomed.knu.ua/images/stories/Kafedry/Fiziologiya/Library/Fiziologia_Metodychni_rekomendatsii_do_laboratornykh_zaniat_Ch1_compressed.pdf
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<http://biph.kiev.ua/uk/UPhSNews>
<http://www.physiologyinfo.org/mm/What-is-Physiology>
<http://www.medicalnewstoday.com/articles/248791.php>
<http://www.physoc.org/>
<http://www.physiologyweb.com/>