MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION,
MINISTRY OF SCIENCE, HIGHER EDUCATION AND INNOVATION OF THE KYRGYZ REPUBLIC
Educational Institution of Higher Education
Kyrgyz-Russian Slavic University named after the First President of the Russian Federation B. N. Yeltsin

APPROVED
Director ICMandBMT
(Position)
Abilova L.C.
(Full name)
04.11. 2026

PROFESSIONAL CYCLE
Normal Physiology

Course Syllabus (Working Programme of the Academic Discipline/Module)

Department Anatomy, Histology and Physiology

Curriculum 310501_26_1 лд ин.plx
560001 General Medicine (for International Students)

Qualification Physician
Mode of study Full-time

Total 9
Hours 270
including:
Contact hours 160
Independent 79.7

Assessment types by semester:
Pass/Fail Assessment – Semester 2

Distribution of course hours by semester

Semester (Course.Year.Semester)	2 (1.2)		3 (2.1)		Total	
Weeks	17		18			
Type of class	Curriculum	Work	Curriculum	Work	SP	WP
Lectures	32	32	16	16	48	48
Practical classes	64	64	48	48	112	112
Contact hours during the theoretical study	0,3	0,3			0,3	0,3
Contact hours during the examination session			0,5	0,5	0,5	0,5
Including interactive	4	4	5	5	9	9
Total contact hours	96	96	64	64	160	160
Contact work	96,3	96,3	64,5	64,5	160,8	160,8
Independent study	53,7	53,7	26	26	79,7	79,7
Assessment hours			29,5	29,5	29,5	29,5
Total	150	150	120	120	270	270

Prepared by:

PhD in Med., Assoc. Professor Kurmashev R.A._____

PhD in Med., Assoc. Professor Makimbetova C.E._____

Reviewer(s):

PhD in Med., Head of Department O. P. Kalugina _____

PhD in Med., Assoc. Professor Dzhailobaeva E.A._____

Approved by the Educational Programme Director:

_____

Course Syllabus

Normal Physiology

developed in accordance with Federal State Educational Standard 3++

Federal State Educational Standard of Higher Education – Specialist Degree Programme in specialty 560001 General Medicine (for International Students) (Order No. 1578/1 of the Ministry of Education and Science of the Kyrgyz Republic dated September 21, 2021)

prepared on the basis of the curriculum:

560001 General Medicine (for International Students)

approved by the University Academic Council on 26 June 2026, Minutes No. 11.

The Course Syllabus was approved at a meeting of the Department of Anatomy, Histology and Physiology

Minutes dated 26 August 2026, No. 1
Validity period of the programme: 2026–2032 academic years

Head of the department:

PhD in Med., Associate Professor O. P. Kalugina _____

RECORD OF AMENDMENTS
to the Course Syllabus (Academic Discipline/Module)

Normal Physiology

name of the academic discipline

No.	Reason for amendment	Section/ clause	Description of the amendment
1.			
2.			
3.			
4.			
5.			

1. COURSE OBJECTIVES	
1.1	To develop students' systematic knowledge of the vital functions of the body as an integrated whole and of its individual components; the fundamental principles governing their functioning and the mechanisms regulating their interactions with one another and with environmental factors; and the physiological foundations of clinical and physiological research methods used in functional diagnostics and in the study of human integrative activity.

2. POSITION OF THE COURSE WITHIN THE EDUCATIONAL PROGRAMME	
Educational programme	B1.O.03
2.1	Prerequisites:
2.1.1	Histology, Embryology and Cytology
2.1.2	Anatomy
2.1.3	Biology
2.1.4	Latin
2.1.5	Fundamentals of Research Methodology
2.2	Courses and practical training for which completion of this course (module) is a prerequisite:
2.2.1	Pathophysiology and Clinical Pathophysiology
2.2.2	Pharmacology
2.2.3	Immunology

3. COMPETENCIES DEVELOPED THROUGH COMPLETION OF THE COURSE (MODULE)	
PC-6: Ability and readiness to assess morphofunctional and physiological states and pathological processes in the human body, taking age and sex groups into account, in order to solve professional tasks.	
Level 1	the main functions of cells, tissues, organs and body systems.
Level 2	the main properties of cells, tissues and organs, and their quantitative characteristics
Level 3	the mechanisms regulating the activity of cells, tissues, organs and systems, as well as the body's interaction with the environment.
Be able to:	
Level 1	use the acquired knowledge to understand the functions of various organs and systems in the integrated body of a healthy person.
Level 2	use knowledge of the functional characteristics of cells, tissues, organs and systems in a healthy body.
Level 3	use knowledge of the mechanisms underlying specific and integrative functions, and their dependence on the environment and the body's condition, to achieve an adaptive and beneficial outcome.
Have practical command of:	
Level 1	skills in working with core educational literature and laboratory equipment.
Level 2	methods for assessing the functional state of a healthy body
Level 3	methods for interpreting the results obtained.

Upon completion of the course, the student should:

3.1	Know:

3.1.1	the structural and functional properties of striated and smooth muscles and the specific features of regulation of their contraction; the role of various parts and structures of the central nervous system (CNS) in regulating somatic and visceral body functions; reflex arcs with visceral and somatic components; the blood system and its role in maintaining and regulating the body's homeostatic constants; blood functions and the characteristics and functional properties of physiological blood constants; blood groups, the Rh factor and its role in pathology, blood transfusion rules, and haemostasis mechanisms; the main stages and parameters of external respiration, and the respiratory centre and its structure; digestion as a process necessary for the body's energy and plastic functions; the structural and functional organization of the gastrointestinal tract and its functional patterns; the development of hunger and satiety; the main processes and mechanisms involved in maintaining a constant body temperature; the main stages of urine formation and the mechanisms regulating them; the kidneys' main homeostatic functions; the main properties of cardiac muscle and how they differ from those of skeletal muscle; mechanisms of excitation–contraction coupling; the chambers and valvular apparatus of the heart; the cardiac cycle and the main mechanisms regulating cardiac activity; the principles of calculating energy expenditure by indirect calorimetry; the specific features of the microcirculatory system, transcapillary exchange and its regulation; the main morphofunctional features of the organization of different parts of sensory systems; the forms of human higher nervous activity (HNA), and the classification and characteristics of HNA types; the mechanisms of conditioned reflex formation and inhibition, their role in clinical practice, and the components of the functional system underlying a behavioural act; the concept and classification of pain; and the morphofunctional organization of the nociceptive and antinociceptive systems.
3.2	Be able to:
3.2.1	Analyse: manifestations of blood functions; the organization of the different stages of respiration and their regulation; and the specific features of human higher nervous activity. Conduct assessments of: the state of the body's coagulation system; blood groups and the Rh factor; the main physiological properties of excitable tissues; reflex activity of the nervous system and autonomic reactivity; sensory system functions; pain sensitivity; individual typological characteristics of a person; and parameters of somatic and visceral system activity (respiratory and cardiovascular) under different functional states of the body.
3.3	Have practical command of:
3.3.1	methods for determining blood groups and the Rh factor; evaluating complete blood count results; assessing blood clotting time; assessing erythrocyte osmotic resistance; counting erythrocytes and leukocytes; evaluating urinalysis results; palpating the pulse; measuring blood pressure; auscultating heart sounds; performing spirometry and peak flowmetry; assessing basal metabolic rate and the degree of its deviation; and assessing types of higher nervous activity.

4. COURSE STRUCTURE AND CONTENT (MODULE)								
Class code	Sections and topics /type of class/	Semester / Year	Hours	Competencies	Literature	Interactive classes	Practical training	Notes
	Section 1. Internal Environment of the Body. Blood Physiology. Humoral Regulation.							
1.1	Introduction. Properties of a living system. Homeostasis. Basic principles of function regulation and self-regulation. Composition and functions of blood. /Lecture/	2	2		Л1.3 Л1.2Л2.9 Э1 Э2 Э3			
1.2	Physicochemical properties of blood. /Lecture/	2	2		Л1.3 Л1.2Л2.9 Э1 Э2 Э3			
1.3	Blood cells (formed elements). /Lecture/	2	2		Л1.3 Л1.2Л2.9 Э1 Э2 Э3			
1.4	Haemostasis. Antigenic properties of blood. /Lecture/	2	2		Л1.3 Л1.2Л2.9 Э1 Э2 Э3			
1.5	Introduction. Properties of a living system. Homeostasis. Basic principles of	2	4		Л1.3 Л1.2Л2.9 Э1 Э2 Э3			
1.6	Physicochemical properties of blood. /Practical class/	2	4		Л1.3 Л1.2Л2.9 Э1 Э2 Э3			

1.7	Blood cells (erythrocytes, leukocytes and platelets). /Practical class/	2	4		Л1.3 Л1.2Л2.9 Э1 Э2 Э3	0,5		Computer simulation of laboratory procedures: determination of haematocrit; measurement of haemoglobin concentration using a photoelectric colorimeter (PEC); and determination of the erythrocyte sedimentation rate (ESR).

1.8	Blood coagulation. Blood antigen systems. /Practical class/	2	4		Л1.3 Л1.2Л2.9 Э1 Э2 Э3	0,5		Computer simulation of laboratory procedures: determination of blood groups using Anti-A and Anti-B coliclones, and determination of Rh status using the Anti-D Super coliclone.
1.9	Humoral regulation system and endocrine functions. Local self-regulation (metabolites, biologically active substances). Hormonal regulation system. /Practical class/	2	4		Л1.3 Л1.2Л2.9 Э1 Э2 Э3			
1.10	Physicochemical properties of blood. /Independent study/	2	3		Л1.3 Л1.2Л2.9 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Prepare a table entitled “Homeostatic Parameters of Blood”.

1.11	Blood cells (erythrocytes, leukocytes and platelets). /Independent study/	2	3		Л1.3 Л1.2Л2.9 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Prepare a table entitled “Homeostatic Parameters of Blood. Part 2”. Draw diagrams showing the structure of blood cells (formed elements).

1.12	Blood coagulation. Blood antigen systems. /Independent study/	2	3		Л1.3 Л1.2Л2.9 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Prepare a haemostasis flowchart and a table of “ABO Blood Groups”
1.13	Humoral regulation system and endocrine functions. Local self-regulation (metabolites, biologically active substances). Hormonal regulation system. /Independent study/	2	4		Л1.3 Л1.2Л2.9 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Prepare a flowchart of self-regulation of the endocrine glands.
1.14	Humoral regulation system and endocrine functions.	2	2		Л1.3 Л1.2Л2.7			
	Section 2. General Physiology of Excitable							
2.1	Biological membranes. Transport of substances, excitability and its measurement. /Lecture/	2	2		Л1.3 Л1.2 Э1 Э2 Э3			
2.2	Bioelectric currents and their characteristics. Characteristics of excitation. /Lecture/	2	2		Л1.3 Л1.2 Э1 Э2 Э3			
2.3	Physiology of nerves and synapses. /Lecture/	2	2		Л1.3 Л1.2 Э1 Э2 Э3			
2.4	Muscle physiology. /Lecture/	2	2		Л1.3 Л1.2 Э1 Э2 Э3			

2.5	Biological membranes. Transport of substances. Resting membrane potential (RMP). /Practical class/	2	4		Л1.3 Л1.2Л2.6 Э1 Э2 Э3			
2.6	Action potential. Nerve physiology. /Practical class/	2	4		Л1.3 Л1.2Л2.6 Э1 Э2 Э3			
2.7	Physiology of synapses and muscles. /Practical class/	2	4		Л1.3	2		Computer simulation of the mechanism of excitation transmission at the neuromuscular junction and the mechanisms of muscle contraction and relaxation.

2.8	Biological membranes. Transport of substances and excitability. /Independent study/	2	3		Л1.3 Л1.2Л2.6 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Prepare a diagram of the structure of a biological membrane. Make notes on the text.
2.9	Bioelectric currents and their characteristics. Characteristics of excitation. /Independent study/	2	3		Л1.3 Л1.2Л2.6 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Prepare a diagram of the electrical processes occurring in a biological membrane. Draw graphs of the action potential (AP) and changes in excitability during excitation.

2.10	Physiology of nerves and synapses. /Independent study/	2	3		Л1.3 Л1.2Л2.6 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Draw diagrams of the structure of a nerve fibre and conduction of excitation along it, as well as the structure of a synapse. Make notes on the text.
2.11	Muscle physiology. /Independent study/	2	3,7		Л1.3 Л1.2Л2.6 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Draw a diagram of the structure of a muscle fibre. Make notes on the text.

	Section 3. Physiology of the Central Nervous System							
3.1	The reflex as a principle of organization of physiological functions. Inhibition in the CNS. Properties of neural centres.	2	2		Л1.3 Л1.2 Э1 Э2 Э3			
3.2	Integration and coordination in the CNS. Spinal cord and brainstem. /Lecture/	2	2		Л1.3 Л1.2 Э1 Э2 Э3			
3.3	Cerebellum. Diencephalon. Telencephalon. /Lecture/	2	2		Л1.3 Л1.2 Э1 Э2 Э3			
3.4	The reflex as a principle of organization of physiological functions.	2	4		Л1.3 Л1.2Л2.7 Э1 Э2 Э3	0,5		Role-play: “The Reflex Arc”
3.5	Properties of neural centres. Principles of reflex interaction. Spinal cord and	2	4		Л1.3 Л1.2Л2.7 Э1 Э2 Э3			
3.6	Midbrain. Cerebellum. Reticular formation.	2	4		Л1.3 Л1.2Л2.7			
3.7	Diencephalon. Limbic system. Basal ganglia. Cerebral cortex. /Practical class/	2	4		Л1.3 Л1.2Л2.7 Э1 Э2 Э3	0,5		Role-play: “Symptoms of Cerebellar Dysfunction”
3.8	The reflex as a principle of organization of physiological functions. Inhibition in the CNS. /Independent study/	2	3		Л1.3 Л1.2Л2.7 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Draw diagrams of the structure of a neuron, the reflex arc, and the types of inhibition.

3.9	Properties of neural centres. Integration and coordination in the CNS. Spinal cord. /Independent study/	2	3		Л1.3 Л1.2Л2.7 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Draw diagrams of divergence, convergence and feedback.
3.10	Medulla oblongata. Midbrain. Reticular formation. /Independent study/	2	3		Л1.3 Л1.2Л2.7 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Make notes on the text.

3.11	Cerebellum. Diencephalon. Limbic system. /Independent study/	2	3		Л1.3 Л1.2Л2.7 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Make notes on the text.
3.12	Basal ganglia and cerebral cortex. /Independent study/	2	3		Л1.3 Л1.2Л2.7 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Make notes on the text.
	Section 4. Regulation of Autonomic Functions.							
4.1	Reflex regulation of somatic and autonomic functions.	2	2		Л1.3 Л1.2 Э1 Э2 Э3			
4.2	Functions of sensory systems. General physiology of sensory reception. /Lecture/	2	2		Л1.3 Л1.2 Э1 Э2 Э3			
4.3	Visual and auditory sensory systems. /Lecture/	2	2		Л1.3 Л1.2 Э1 Э2 Э3			
4.4	Gustatory and olfactory systems. Vestibular	2	2		Л1.3 Л1.2 Э1 Э2 Э3			
4.5	Reflex regulation of somatic and autonomic functions. /Practical class/	2	4		Л1.3 Л1.2Л2.7 Э1 Э2 Э3			
4.6	Functions of sensory systems. General physiology of sensory reception.	2	4		Л1.3 Л1.2Л2.7 Э1 Э2 Э3			
4.7	Visual and auditory sensory systems. /Practical class/	2	4		Л1.3 Л1.2Л2.7 Э1 Э2 Э3			
4.8	Somatic and visceral sensory reception. Gustatory and olfactory systems. /Practical class/	2	4		Л1.3 Л1.2Л2.7 Э1 Э2 Э3			

4.9	Reflex regulation of somatic and autonomic functions. /Independent study/	2	3		Л1.3 Л1.2Л2.7 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Draw a diagram of autonomic reflex arcs. Make notes on the text.

4.10	Functions of sensory systems. General physiology of sensory reception. /Independent study/	2	3		Л1.3 Л1.2Л2.7 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Make notes on the text.
4.11	Visual and auditory sensory systems. /Independent study/	2	4		Л1.3 Л1.2Л2.7 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Make notes on the text.
4.12	Somatic and visceral sensory reception. Gustatory and olfactory systems. /Independent study/	2	3		Л1.3 Л1.2Л2.7 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Make notes
4.13	/Midterm assessment/	2	0,3					
4.14	/Pass/Fail assessment/	2						
	Section 5. Physiology of Blood Circulation and							
5.1	Properties of the	3	2		Л1.3			
5.2	Phase analysis of the cardiac cycle. External manifestations of cardiac activity. /Lecture/	3	2		Л1.3 Л1.2Л2.8 Л2.1 Э1 Э2 Э3			
5.3	Physiology of haemodynamics. /Lecture/	3	2		Л1.3 Л1.2Л2.8 Л2.4 Л2.1 Э1 Э2 Э3			
5.4	Regulation of blood circulation. /Lecture/	3	2		Л1.3 Л1.2Л2.8 Л2.4 Л2.1 Э1 Э2 Э3			
5.5	Physiological properties of cardiac muscle. Automaticity and conduction. /Practical class/	3	3		Л1.3 Л1.2Л2.8 Л2.1 Э1 Э2 Э3	0,5		Computer simulation of the experiments of Gaskell

5.6	Excitability and contractility. /Practical class/	3	3		Л1.3 Л1.2Л2.8 Л2.1 Э1 Э2 Э3			
5.7	Phase analysis of the cardiac cycle. External manifestations of cardiac activity. /Practical class/	3	3		Л1.3 Л1.2Л2.8 Л2.1 Э1 Э2 Э3	0,5		Computer simulation of the cardiac cycle.

5.8	Basic principles of haemodynamics. /Practical class/	3	3		Л1.3 Л1.2Л2.4 Л2.1 Э1 Э2 Э3	1		Case discussion: “Factors responsible for the transformation of intermittent blood flow into continuous flow”; “The influence of various factors on pressure in the cardiovascular system using Weber’s open model as an example”.
5.9	Characteristics of blood flow in vessels. /Practical class/	3	3		Л1.3 Л1.2Л2.4 Л2.1 Э1 Э2 Э3			
5.10	Mechanisms regulating systemic circulation. /Practical class/	3	3		Л1.3 Л1.2Л2.8 Л2.4 Л2.1 Э1 Э2 Э3	0,5		Computer simulation of the effects of various substances on cardiac function and of the effects of the vagus and sympathetic nerves on the heart.

5.11	Physiological properties of cardiac muscle. Automaticity and conduction. /Independent study/	3	1		Л1.3 Л1.2Л2.8 Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Draw diagrams of the systemic and pulmonary circulations, the structure of the heart, and its conduction system.
5.12	Excitability and contractility. /Independent study/	3	1		Л1.3 Л1.2Л2.8 Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Draw action potential (AP) graphs for typical and atypical myocardium.

5.13	Phase analysis of the cardiac cycle. External manifestations of cardiac activity. /Independent study/	3	1		Л1.3 Л1.2Л2.8 Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Draw diagrams of the cardiac cycle and an ECG. Make notes on the text.
5.14	Basic principles of haemodynamics. /Independent study/	3	1		Л1.3 Л1.2Л2.4 Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes and make notes on the text. Draw graphs showing changes in vascular resistance,
5.15	Characteristics of blood flow in vessels. /Independent study/	3	1		Л1.3 Л1.2Л2.4 Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes and make notes on the text. Draw a Starling mechanism diagram.

5.16	Mechanisms regulating systemic circulation. /Independent study/	3	1		Л1.3 Л1.2Л2.8 Л2.4 Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes and make notes on the text. Draw diagrams of the reflex arcs involved in the regulation of blood circulation.

5.17	Specific features of regional haemodynamics. /Independent study/	3	1		Л1.3 Л1.2Л2.4 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes and make
	Section 6. Physiology of Respiration							
6.1	Physiology of respiration. /Lecture/	3	2		Л1.3 Л1.2Л2.5 Л2.1 Э1 Э2 Э3			
6.2	External respiration. Mechanisms of inhalation and exhalation. Gas exchange in the lungs and its determinants. Lung volumes and capacities. /Practical class/	3	3		Л1.3 Л1.2Л2.5 Л2.1 Э1 Э2 Э3	0,5		Case discussion: “Changes in intrapleural pressure during breathing using Donders’ model”;
6.3	Transport of gases by the blood. Gas exchange in tissues. Regulation of respiration. Hypo- and	3	3		Л1.3 Л1.2Л2.5 Л2.1 Э1 Э2 Э3			
6.4	External respiration. Mechanisms of inhalation and exhalation. Gas exchange in the lungs and its determinants. Lung volumes and capacities. /Independent study/	3	1		Л1.3 Л1.2Л2.5 Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Make notes on the text.

6.5	Transport of gases by the blood. Gas exchange in tissues. Regulation of respiration. Hypo- and hyperbaric conditions. Hypoxia. Mountain sickness. /Independent study/	3	2,5		Л1.3 Л1.2Л2.5 Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes and make notes on the text. Draw the reflex arcs of intrinsic respiratory reflexes.
	Section 7. Physiology of Metabolism, Thermoregulation and Excretion.							

7.1	Physiology of metabolism, nutrition and thermoregulation. /Lecture/	3	2		Л1.3 Л1.2Л2.1 Э1 Э2 Э3			
7.2	Energy metabolism. Basal metabolic rate. Thermoregulation. Physiology of nutrition. /Practical class/	3	3		Л1.3 Л1.2Л2.1 Э1 Э2 Э3			
7.3	Functions of the kidneys. Mechanisms of urine formation. Regulation of filtration and reabsorption. /Practical class/	3	3		Л1.3 Л1.2Л2.3 Л2.1 Э1 Э2 Э3	0,5		Computer simulation of the processes of urine formation.
7.4	Energy metabolism. Basal metabolic rate. Thermoregulation. Physiology of nutrition. /Independent study/	3	1,5		Л1.3 Л1.2Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes and make notes on the text.
7.5	Functions of the kidneys. Mechanisms of urine formation. Regulation of filtration and reabsorption. /Independent study/	3	1,5		Л1.3 Л1.2Л2.3 Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes and make notes on the text. Draw a diagram of the structure of the nephron.

7.6	Role of the kidneys in maintaining body homeostasis. /Independent study/	3	2,5		Л1.3 Л1.2Л2.3 Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes and make notes on the text. Draw a diagram illustrating the effects of aldosterone and antidiuretic hormone (ADH) on the nephron.
	Section 8. Physiology of Digestion							
8.1	Physiology of digestion. /Lecture/	3	2		Л1.3 Л1.2 Л1.1Л2.1 Э1 Э2 Э3			
8.2	Characteristics of the main processes involved in digestion (secretion, absorption, motility, incretion and excretion). /Practical class/	3	3		Л1.3 Л1.2 Л1.1Л2.1 Э1 Э2 Э3	0,5		Role-play: “Mechanisms of absorption of various substances in the gastrointestinal tract”.
8.3	Digestion in the oral cavity and stomach. /Practical class/	3	3		Л1.3 Л1.2 Л1.1Л2.1 Э1 Э2 Э3			

8.4	Pancreatic function. Role of the liver in digestion. Digestion in the small and large intestines. /Practical class/	3	3		Л1.3 Л1.2 Л1.1Л2.1 Э1 Э2 Э3			

8.5	Characteristics of the main processes involved in digestion (secretion, absorption, motility, incretion and excretion). /Independent study/	3	2,5		Л1.3 Л1.2 Л1.1Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes and make notes on the text. Prepare diagrams of the main digestive processes and the relationships between enzymes involved in luminal and membrane digestion, as well as the processes of absorption of the main nutrients.

8.6	Digestion in the oral cavity and stomach. /Independent study/	3	2,5		Л1.3 Л1.2 Л1.1Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes and make notes on the text. Prepare a table describing the specific features of digestion in the oral cavity and stomach.

8.7	Pancreatic function. Role of the liver in digestion. Digestion in the small and large intestines. /Independent study/	3	2		Л1.3 Л1.2 Л1.1Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes and make notes on the text. Prepare a table describing the specific features of digestion in the small and large intestines.

	Section 9. Physiology of Higher Nervous Activity							

9.1	Physiology of higher nervous activity (HNA). /Lecture/	3	2		Л1.3 Л1.2Л2.2 Л2.1 Э1 Э2 Э3			
9.2	Conditioned and unconditioned reflexes. Memory. Inhibition in the cerebral cortex. /Practical	3	3		Л1.3 Л1.2Л2.2 Л2.1 Э1 Э2 Э3			
9.3	Specific features of human higher nervous activity. Dynamic stereotype. Types of HNA. /Practical class/	3	3		Л1.3 Л1.2Л2.2 Л2.1 Э1 Э2 Э3	1		Role-play: “Models of Behavioural Responses in Different Temperament Types”.
9.4	Emotions. Motivations. Physiology of sleep. /Practical class/	3	3		Л1.3 Л1.2Л2.2 Л2.1 Э1 Э2 Э3			
9.5	Conditioned and unconditioned reflexes. Memory. Inhibition in the cerebral cortex. /Independent study/	3	1		Л1.3 Л1.2Л2.2 Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes. Make notes on the text.
9.6	Specific features of human higher nervous activity. Dynamic stereotype. Types of HNA. /Independent study/	3	1		Л1.3 Л1.2Л2.2 Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes and make notes on the text. Prepare a table entitled “Types of Human Higher Nervous Activity and Their Characteristics”.

9.7	Emotions. Motivations. Physiology of sleep. /Independent study/	3	1		Л1.3 Л1.2Л2.2 Л2.1 Э1 Э2 Э3			Read the textbook and additional literature. Review lecture notes and make notes on the text. Prepare a table entitled “Sleep Phases and Their Characteristics”.
9.8	/Midterm examination/	3	0,5		Л1.3			
9.9	/Examination/	3	29,5		Л1.3 Л1.2 Э1 Э2 Э3			

5. ASSESSMENT MATERIALS
5.1. Assessment Questions and Tasks

Questions for assessing KNOWLEDGE:

Semester 3

- Physiology as a science and academic discipline; methods of physiology.
- The external and internal environments of the body and their interaction.
- Blood: volume, functions and composition.
- Physicochemical properties of blood: viscosity, density, osmotic and oncotic pressure.
- Haemolysis and its types.
- Acid–base balance and blood buffer systems.
- Blood cells (erythrocytes, leukocytes and platelets): number, properties and functions.
- Haemostasis and the anticoagulant system of the blood.
- Blood antigen systems.
- Biological membrane. Transport of substances across the membrane.
- Excitability and methods of measuring it.
- Electrical currents in living tissues: resting membrane potential and action potential.
- Characteristics of excitation: refractory periods, the “all-or-none” law and the conditions under which it applies.
- Nerve physiology.
- Synaptic physiology.
- Muscle physiology.
- Nervous system: functions, evolution and classification.
- Physiology of neurons and central synapses.
- Reflex: definition, significance and classification. Reflex arcs. Reflex time.
- Inhibition in the CNS.
- Neural centre. Properties of neural centres.
- Interaction of reflexes.
- Regional physiology of the CNS: spinal cord, medulla oblongata, pons, midbrain, cerebellum, diencephalon and telencephalon.
- Central nervous regulation of somatic and autonomic functions.
- General physiology of sensory systems: receptor, communication channel and central division.
- Special physiology of sensory systems: visual, auditory, vestibular, somatic and visceral, pain, gustatory and olfactory systems.
- Local and systemic humoral regulation.
- Hormones: classification, functions, properties and mechanisms of action.

Semester 4

- Physiological properties of cardiac muscle: automaticity, conduction, excitability and contractility.
- Phase analysis of the cardiac cycle.
- External manifestations of cardiac activity.
- Basic principles of haemodynamics.
- Characteristics of blood flow through vessels.
- Mechanisms regulating systemic circulation.
- External respiration. Mechanisms of inhalation and exhalation. Gas exchange in the lungs and its determinants. Lung volumes and capacities.
- Transport of gases by the blood. Gas exchange in tissues. Regulation of respiration. Hypo- and hyperbaric conditions. Hypoxia. Mountain sickness.
- Energy metabolism. Basal metabolic rate. Thermoregulation. Physiology of nutrition.
- Kidney functions. Mechanisms of urine formation. Regulation of filtration and reabsorption.
- Role of the kidneys in maintaining body homeostasis.

Semester 4
- Draw a diagram of the systemic and pulmonary circulations.
- Draw a diagram of the cardiac conduction system.
- Draw action potential (AP) graphs for typical and atypical myocardium.
- Draw a graphical representation of the cardiac cycle.
- Calculate the duration of the cardiac cycle.
- Draw an ECG diagram in standard lead II.
- Draw graphs showing changes in blood pressure, vascular resistance and linear blood flow velocity along the vascular bed.
- Explain the operating principle of Weber's open model of circulation.
- Draw a Starling diagram (exchange of water and substances in capillaries).
- Draw diagrams of intrinsic and associated reflexes involved in the regulation of blood circulation.
- Calculate pulse pressure, mean dynamic pressure, volumetric blood flow velocity and peripheral resistance in a person.
- Calculate the predicted vital capacity of the lungs according to sex, height and age.
- Draw diagrams of the reflex arcs of intrinsic respiratory reflexes.
- Calculate predicted basal metabolic rate using the Harris–Benedict tables.
- Calculate the degree of deviation of basal metabolic rate using Reed's formula.
- Draw a diagram of the structure of the nephron.
- Calculate the glomerular filtration rate using inulin clearance.
- Draw a diagram of the main digestive processes.
- Draw diagrams of nutrient absorption (proteins, fats and carbohydrates).

Questions for assessing PRACTICAL COMPETENCE:
Semester 3
- Demonstrate the technique for counting erythrocytes using a Goryaev chamber.
- Demonstrate the technique for determining the erythrocyte sedimentation rate (ESR) using the Panchenkov method.
- Demonstrate the technique for determining haemoglobin concentration by the colorimetric method (Sahli method).
- Demonstrate the technique for counting leukocytes using a Goryaev chamber.
- Demonstrate the technique for determining blood antigen properties using monoclonal antibody reagents (coliclones).
- Demonstrate the technique for determining blood clotting time (Bürker modification).
- Demonstrate the technique for determining bleeding time (Duke method).
- Demonstrate the technique for preparing a frog neuromuscular preparation.
- Demonstrate the technique for determining the stimulation threshold of excitable tissues.
- Demonstrate Galvani's second experiment.
- Demonstrate Matteucci's experiment.
- Demonstrate the experimental method for verifying the laws of excitation conduction along a nerve.
- Demonstrate the technique for recording muscle contraction at different stimulus strengths and frequencies.
- Demonstrate the technique for determining spinal reflex time in a frog.
- Demonstrate the experimental method for verifying central inhibition of spinal reflexes (Sechenov's experiment).
- Demonstrate the technique for testing spinal monosynaptic reflexes in humans.
- Demonstrate the technique for assessing cerebellar coordination using special tests.
- Demonstrate the technique for examining postural-tonic reflexes in a rabbit.
- Demonstrate the method for assessing autonomic tone by calculating the Kerdo vegetative index.
- Demonstrate the method for assessing autonomic nervous system reactivity using the Dagnini–Aschner reflex.

5.2. Topics of Course Papers (Projects)
No course papers or projects are required.
5.3. Assessment Materials

SAMPLE TEST VERSION

1. Filtration takes place in which part of the nephron?
a) distal tubule
b) proximal tubule
c) ascending limb of the loop of Henle
d) renal corpuscle (glomerulus)

2. What are the functions of hydrochloric acid in gastric juice?
a) It causes protein denaturation and activates pepsinogen.
b) It denatures proteins and activates salivary amylase.
c) It inhibits the secretion of hormones by the duodenum.
d) It emulsifies fats and inhibits the action of lipase.

3. Basal metabolic rate depends on:
a) sex, body weight, height and age
b) age, physical activity and intelligence
c) physical activity and ambient temperature
d) emotional arousal

4. Which hormone increases blood glucose levels?
a) aldosterone
b) glucagon
c) insulin
d) parathyroid hormone

5. The main role in heat loss is played by:
a) liver and heart
b) muscles and connective tissue
c) skin and lungs
d) brown adipose tissue

6. Local excitation is characterized by the following features:
a) it occurs in response to subthreshold stimuli, is capable of summation and spreads decrementally
b) it occurs in response to threshold stimuli and is not capable of summation
c) it spreads in a saltatory manner over long distances
d) it produces a specific response and excitability is reduced

7. The following changes are caused by activation of the parasympathetic nervous system:
a) inhibition of cardiac activity and increased gastric secretion
b) increased gastric secretion and vasoconstriction
c) increased arterial pressure and increased secretion by intestinal glands
d) vasodilation and tachycardia

8. Vasodilation occurs under the action of:
a) vasopressin
b) acetylcholine, histamine and prostaglandins
c) the renin–angiotensin system
d) aldosterone

10. Which feature is NOT characteristic of chemical synapses?
a) synaptic delay
b) high fatigability
c) low lability
d) bidirectional conduction of excitation

11. The main vascular reflexogenic zones containing chemoreceptors are located in the:
a) aortic arch and carotid sinus
b) openings of the venae cavae
c) small arteries
d) capillary bed and arteriovenous anastomoses

12. I. P. Pavlov based the classification of people into types of higher nervous activity on the following properties of nervous processes:
a) plasticity, lability and fatigability
b) excitability, conductivity and irritability
c) strength, mobility and balance of excitation and inhibition processes
d) lability, conductivity and mobility

13. Human instincts:
a) are absent
b) are developed throughout life
c) are present from birth
d) disappear during life

14. Enzymes of pancreatic juice include:
a) gastricsin and rennin
b) pepsin and enterokinase
c) amylase, lipase, trypsin and chymotrypsin
d) bile acids and bilirubin

15. Formation of a conditioned reflex requires repeated:
a) reinforcement of the conditioned stimulus by the unconditioned stimulus
b) presentation of the conditioned stimulus
c) reinforcement of the unconditioned stimulus by the conditioned stimulus
d) presentation of the unconditioned stimulus

16. Apnoea following voluntary hyperventilation occurs as a result of:
a) hypercapnia
b) hyperoxia
c) hypoxaemia
d) hypocapnia

17. An excitatory postsynaptic potential is a local depolarization process that develops in the membrane of the:
a) sarcoplasmic membrane
b) mitochondrial membrane
c) presynaptic membrane
d) postsynaptic membrane

d) 0.9% sodium chloride

20. The result of the third phase of blood coagulation is:
a) platelet adhesion and aggregation
b) formation of prothrombinase
c) formation of thrombin
d) formation of fibrin

21. The resting cardiac output in an adult is:
a) 1.5–2 L
b) 13.0–13.5 L
c) 4.5–5.0 L
d) 8.0–9.0 L

22. Stimulation of aortic and carotid artery baroreceptors causes:
a) depressor reflexes
b) pressor reflexes
c) unloading reflexes
d) associated reflexes

23. Second-order waves on the blood pressure curve are associated with:
a) cardiac activity
b) the tone of the vasomotor centre
c) phases of respiration
d) the tone of the somatic nervous system

24. The oxygen capacity of blood depends on:
a) atmospheric pressure
b) the protein content of plasma
c) the number of leukocytes
d) the amount of haemoglobin
e) the partial pressure of oxygen

25. The general pause of the heart is important for:
a) filling the heart with blood and restoring myocardial energy reserves
b) movement of blood from the ventricles into the atria
c) opening of the semilunar valves
d) creating a pressure gradient for blood to enter the vessels

26. “Vis a fronte” (force from the front) refers to:
a) the action of venous valves
b) the suction effect of the thoracic cavity
c) contraction of skeletal muscles
d) the residual energy of the heart

27. Parietal (membrane) digestion occurs in the:
a) oral cavity
b) small intestine

COLLOQUIUM QUESTIONS

Section “General Physiology of Excitable Structures”

Biological membranes: definition, functions, structure and properties.
Transport of substances across membranes: significance, types and characteristics.
Concepts of irritability and excitability. Types of stimuli. Measures of excitability.
Bioelectric potentials: concept and types (resting membrane potential, RMP; action potential, AP), recording and mechanisms of generation.
The “all-or-none” law and the conditions under which it applies.
Changes in excitability during excitation and their phases. Relationship between the phases of excitability changes and the action potential.
Neuron: structural features and functions of its components.
Nerve fibres: structure, functions of structural components and properties.
Mechanism of excitation conduction along nerve fibres.
The law of excitation conduction along a nerve and its characteristics.
Synapse: concept, structure, classification and properties.
Neurotransmitters and their characteristics.
Stages and mechanisms of synaptic transmission of excitation.
Postsynaptic potential (PSP): features and types.
Types of muscles and their functions.
Macro-, micro- and ultrastructure and properties of skeletal muscles.
Biomechanics and bioenergetics of muscle contraction and relaxation.
Types of muscle contraction.
Single muscle contraction: phases and duration.
Tetanus: types and mechanism of development.
Muscle work and strength. Regulation of muscle contraction strength.
Contracture: types and mechanism of development.
Muscle fatigue: conditions of occurrence, manifestations, active and passive rest.
Smooth muscles: structure, functions and properties.

Section “Physiology of Digestion”

Digestion and its significance.
Principles of gastrointestinal tract function.
Main processes involved in digestion and their characteristics.
Secretion. Specific features of gastrointestinal enzymes. Types of digestion and their characteristics.
Gastrointestinal motility: types and functions of motor activity of the gastrointestinal tract.
Absorption in the gastrointestinal tract. Conditions required for absorption. Degree of absorption in different parts of the gastrointestinal tract.
Mechanisms of absorption of various substances in the gastrointestinal tract.
Incretion and excretion in the gastrointestinal tract. Specific features of the action of gastrointestinal hormones.
Regulation of gastrointestinal tract function: basic principles and mechanisms; contribution of different regulatory mechanisms in various parts of the gastrointestinal tract.
Methods for studying gastrointestinal tract function.
Digestion in the oral cavity: specific features. Functions of the oral cavity. Methods for examining the oral cavity.
Secretion in the oral cavity; salivary glands; composition and functions of saliva.

Nervous system: functions and classification.
Neuron: classification, structure, functions and properties.
Neuroglia: cell types and their functions.
Synapses in the CNS: specific features, properties and mechanism of excitation transmission.
Reflex: classification and biological role.
Structure of the somatic nervous system reflex arc; functions and location of its components.
Reflex time and factors determining its duration.
Inhibition: classification and functions.
Differences between excitation and inhibition in the CNS.
Presynaptic inhibition in the CNS: location and functions.
Postsynaptic inhibition: location and functions.
Reciprocal inhibition in antagonist centres.
Concept of neural centres and their properties.
Summation in the CNS: types and significance.
Interaction of reflexes (common final pathway, irradiation).
Dominant focus: types, significance, properties, and conditions for its development and disappearance.
Structure and functions of the spinal cord; main spinal reflexes.
Conductive function of the spinal cord; spinal shock.
Functions of the medulla oblongata.
Physiology of the midbrain; orienting reflexes.
Physiology of the cerebellum.
Physiology of the thalamus.
Physiology of the hypothalamus.
Functions of the limbic system.
Cerebral cortex: cytoarchitecture and functions of the neocortex.
Motor functions of the somatic nervous system and the general plan of its organization. Differences between the somatic and autonomic nervous systems.
Sympathetic nervous system: structure, functions and reflex arc.
Parasympathetic nervous system: structure, reflex arcs and functions.
Metasympathetic nervous system.
Higher autonomic centres.
Concept of a sensory system (analyser), its structure and the main processes occurring in sensory systems.
Classification of receptors.
Properties of receptors and their characteristics; sensory thresholds.
Specific features of the conducting and central divisions of a sensory system.
Eye: structure and functions of its components.
Optical system of the eye; refraction and accommodation and their disorders.
Light and colour perception.
Auditory sensory system and sound perception.
Olfactory sensory system.
Gustatory sensory system.
Somatic and visceral sensory system: tactile, temperature and pain reception.
Visceroreception and its role in regulating the activity of internal organs.
Pain (nociceptive) reception and the antinociceptive system.

Section “Physiology of Blood Circulation and Lymph Circulation”

Functions of the cardiovascular system; role of the heart and its macrostructure.

Basic principles of blood circulation regulation and its levels (local and central).
Intracardiac and intravascular regulation (myogenic and neurogenic mechanisms).
Innervation of the heart; classification of the trophic effects of the vagus and sympathetic nerves on the heart.
Concept and structure of the medullary cardiovascular centre.
Vascular innervation (vasoconstrictor and vasodilator neural mechanisms).

5.4. List of Assessment Methods

Testing (ongoing assessment)
Attendance (ongoing assessment)
Written homework (ongoing assessment)
Testing (midterm assessment)
Colloquium
Oral interview

TESTING GRADING SCALE (ONGOING ASSESSMENT)
At each practical class, the student is given a test consisting of 5 questions, each with one correct answer.
Test scores are awarded as follows:
0–40% of questions (0–2 correct answers): 0–1 point;
60% of questions (3 correct answers): 1.5 points;
80% of questions (4 correct answers): 2 points;
100% of questions (5 correct answers): 2.5 points.
All test scores are added together and divided by the number of classes in the section; that is, the arithmetic mean score for the section is calculated.

ATTENDANCE GRADING SCALE (ONGOING ASSESSMENT)
Attendance at classes in one section:
0–59%: 0–0.25 points
60–69%: 0.5 points
70–84%: 0.75 points
85–100%: 1 point

INDEPENDENT STUDY GRADING SCALE: WRITTEN HOMEWORK (ONGOING ASSESSMENT)
The student must complete a homework assignment for each practical class.
Completion of 0–59% of assignments in one section: 0–0.9 points
60–69%: 1 point
70–84%: 1.25 points
85–100%: 1.5 points

TEST GRADING SCALE (MIDTERM ASSESSMENT)
1. Each test contains 20 questions.
2. Each question has a set of answer options: one correct and the others incorrect.
3. Each correct answer is worth 5%.
4. The overall result is determined as the sum of the percentages earned.
5. The percentage score is converted into points.
For the section “Internal Environment of the Body. Blood Physiology. Humoral Regulation”:
0–60% (0–12 correct answers): 0–7 points
65–75% (13–15 correct answers): 8–9 points
80–90% (16–18 correct answers): 10–11 points
95–100% (19–20 correct answers): 12 points

“85–100%”
• thorough and solid mastery of the section material;
• complete, consistent, accurate and logically presented answers;
• demonstration of knowledge within the completed programme and information from additional literature;
• reproduction of the learning material with the required degree of accuracy.

“70–84%”
• minor errors that the student confidently corrects after additional and prompting questions;
• demonstration of knowledge within the completed programme;
• clear presentation of the learning material.

“60–69%”
• minor errors in the answer that the student does not correct;
• demonstration of insufficiently complete knowledge of the completed programme;
• unstructured and incoherent presentation of the learning material.

“Below 60%”
• lack of knowledge of the section material;
• serious errors in the answer.

For the colloquium on “Basic Mechanisms of Cell Function”:
0–59%: 0–9 points
60–69%: 10–12 points
70–84%: 13–15 points
85–100%: 16–18 points

For the colloquium on “Physiology of Digestion”:
0–59%: 0–5 points
60–69%: 6–7 points
70–84%: 8–9 points
85–100%: 10 points

ORAL INTERVIEW GRADING SCALE (MIDTERM ASSESSMENT)

“85–100%”
• thorough and solid mastery of the section material;
• complete, consistent, accurate and logically presented answers;
• demonstration of knowledge within the completed programme and information from additional literature;
• reproduction of the learning material with the required degree of accuracy.

“70–84%”
• minor errors that the student confidently corrects after additional and prompting questions;
• demonstration of knowledge within the completed programme;
• clear presentation of the learning material.

“60–69%”
• minor errors in the answer that the student does not correct;
• demonstration of insufficiently complete knowledge of the completed programme;

85–100% (6 points): The answer demonstrates solid knowledge of the main physiological processes and is characterized by depth and completeness of topic coverage; command of terminology; ability to explain the essence of mechanisms, draw conclusions and generalizations, provide reasoned answers and give examples; fluent monologue speech; and logical, consistent presentation.

70–84% (5 points): The answer demonstrates solid knowledge of the main physiological processes and is characterized by depth and completeness of topic coverage; command of terminology; ability to explain the essence of mechanisms, draw conclusions and generalizations, provide reasoned answers and give examples; fluent monologue speech; and logical, consistent presentation. However, one or two inaccuracies in the answer are permitted.

60–69% (4 points): The answer generally demonstrates knowledge of physiological processes but lacks sufficient depth and completeness of topic coverage; demonstrates knowledge of the main theoretical issues; shows poorly developed skills in analysing mechanisms and insufficient ability to provide reasoned answers and examples; and demonstrates limited fluency, logic and consistency in monologue speech. Several errors in the content of the answer are permitted.

0–59% (0–3 points): The answer demonstrates a lack of knowledge of physiological processes and insufficient depth of topic coverage; lack of knowledge of the main theoretical issues; undeveloped skills in analysing mechanisms; inability to provide reasoned answers; poor command of monologue speech; and lack of logical and consistent presentation. Serious errors in the content of the answer are permitted.

ANALYTICAL TASK GRADING SCALE (INTERIM ASSESSMENT – “SKILLS”)
The following criteria are taken into account when assessing answers for the SKILLS level:
85–100% (8 points): The student demonstrates complete understanding of the task. All requirements are met.
70–84% (7 points): The student demonstrates substantial understanding of the task. Most requirements are met. Minor errors are present.
60–69% (5–6 points): The student demonstrates partial or limited understanding of the task. No more than half of the task is completed; a large number of errors are made.

6. EDUCATIONAL, METHODOLOGICAL AND INFORMATIONAL SUPPORT FOR THE COURSE

6.1. Recommended Literature

6.1.1. Core Literature

	Authors, Compilers	Title	Publisher, Year
Л1.1	A. G. Zarifyan, T. N. Naumova,	Physiology of Digestion: Study Guide	Bishkek: KRSU Publishing House, 2019
Л1.2	N. A. Agadzhanyan, V. M. Smirnov	Normal Physiology: Textbook	Moscow: Medical Information Agency Publishing House, 2012
Л1.3	Rodney R.G.	Physiology: Study Guide	

6.1.2. Supplementary Literature

	Authors, Compilers	Title	Publisher, Year
Л2.1	A. G. Zarifyan, T. N. Naumova,	Special Physiology. Part II: Lecture Course for Students Majoring in Dentistry	Bishkek: KRSU Publishing House, 2017
Л2.2	A. G. Zarifyan, Ch. E. Makimbetova,	Physiology of Higher Nervous Activity: Study Guide	Bishkek: KRSU Publishing House, 2015

	Authors, Compilers	Title	Publisher, Year
Л2.3	A. G. Zarifyan, I. E. Kononets,	Physiology of Excretion: Study Guide	Bishkek: KRSU Publishing House, 2015
Л2.4	A. G. Zarifyan, I. E. Kononets, E. A.	Physiology of Haemodynamics: Study Guide	Bishkek: KRSU Publishing House, 2014
Л2.5	A. G. Zarifyan, T. N. Naumova, A. K. Nartaeva,	Respiratory Physiology: Study Guide	Bishkek: KRSU Publishing House, 2014
Л2.6	KRSU; KSMA	General Physiology of Excitable Structures: Methodological Guide for Practical Classes in	Bishkek: KRSU Publishing House, 2001
Л2.7	Compiled by A. G. Zarifyan, T. N.	Normal Physiology. Part I: Lecture Course for Students Majoring in Dentistry	2008
Л2.8	Compiled by A. G.	Cardiac Physiology: Study Guide	Bishkek: KRSU Publishing
Л2.9	Compiled by A. G. Zarifyan et al.; KRSU	Blood Physiology: Methodological Guide for Practical Classes in Normal Physiology	Bishkek: KRSU Publishing House, 2007

6.2. List of Information and Telecommunication Network Resources (Internet)		
Э1	KRSU Electronic Library	http://www.lib.krsu.edu.kg
Э2	Znanium Electronic Library System	http://www.znanium.com
Э3	KRSU Department of Normal Physiology YouTube Channel	https://www.youtube.com/channel/UCr5ie5HUP8hChUfI

6.3. List of Information and Educational Technologies	
6.3.1 Competency-Based Educational Technologies	
6.3.1.1	Traditional educational technologies: lectures, practical classes and reconstructive laboratory work aimed at communicating knowledge and methods of action to students in a ready-made form for them to master. Lectures involve the use of multimedia equipment. Practical classes are conducted using
6.3.1.2	Innovative educational technologies: role-play activities, case studies, and student preparation of reports with presentations on assigned topics.
6.3.1.3	Information and educational technologies: independent use by students of computers and Internet resources (computer simulation programmes; see Section 6.3.2). Viewing educational videos.
6.3.2. List of Information and Reference Systems and Software	
6.3.2.1	Multimedia educational disc “Interactive Physiology”
6.3.2.2	Computer simulation programme “PhysioEx 8.0 for Human Physiology”
6.3.2.3	Computer simulation programme “Physiology Interactive Lab Simulations 3.0”
6.3.2.4	Multimedia educational disc “Blood and the Circulatory System”.
6.3.2.5	Computer simulation programme “LuPraFi-Sim” – Virtual Physiology.
6.3.2.6	KRSU Electronic Library (http://www.lib.krsu.edu.kg)
6.3.2.7	Znanium Electronic Library System (http://www.znanium.com)

7. MATERIAL AND TECHNICAL RESOURCES FOR THE COURSE (MODULE)	
7.1	Lectures are held in a lecture hall with 200 seats, equipped with a projector and an interactive whiteboard.
7.2	Practical classes, group and individual consultations, ongoing assessment and interim assessment are held in five classrooms, each with 18 seats.

7.3	A vivarium is available for housing laboratory animals, as well as a room for storing and performing preventive maintenance on educational and laboratory equipment.
7.4	The following demonstration equipment is used in teaching the course: 7 desktop computers, 2 projectors and 2 laptops
7.5	A wide range of teaching and visual aids is available: 57 educational films, 9 stands, 173 charts and 5

7.6	The following laboratory equipment is used during practical classes: dry-air spirometers, an electrical stimulator, sphygmomanometers with stethoscopes, Biolam microscopes, electronic scales, a thermostat, chemical reagents for analysing the physicochemical and antigenic properties of blood, and laboratory glassware.
7.7	Two rooms with 24 seats each are available for students' independent study. They are equipped with computers connected to the Internet and provide access to the KRSU electronic information and educational environment. The library also has a reading room with 50 seats.

8. GUIDELINES FOR STUDENTS ON COMPLETING THE COURSE (MODULE)

The course flowcharts are provided in Appendix No. 1.

1. ADVICE ON PLANNING AND ORGANIZING THE TIME REQUIRED TO STUDY THE COURSE
It is recommended that the time required to study the course be organized as follows:
Review lecture notes on the day before a practical class: 15–20 minutes.
Study theoretical material using the textbook and lecture notes: 1 hour per week.
Preparation for a practical class: 2 hours.
Total per week: 3 hours 20 minutes.

2. STUDENT INDEPENDENT STUDY
To understand the material and master it effectively, the following sequence of actions is recommended:
- When preparing for a practical class, the student should review the methodological guidelines for the upcoming class (posted on the department notice board).
- Revise the relevant material from courses studied before Normal Physiology.
- Find answers to the self-study questions in lecture materials and core and supplementary literature.
- Complete the written homework in the workbook (prepare notes, tables and practical-work protocols; draw diagrams and graphs).

3. PREPARATION FOR TESTS
Preparation for tests requires reviewing lecture materials and reading core and supplementary literature.

4. PREPARATION FOR COLLOQUIA AND ORAL INTERVIEWS

Technological Map of the Discipline
"Normal Physiology"

Course/semester: 1/2
Number of credits (credit units): 4
Assessment: pass

Discipline module name according to the Work Program	Assessment	Assessment format	Minimum passing score	Maximum passing score	Assessment schedule
Module 1					
Internal Environment of the Body. Blood Physiology. Humoral Regulation.	Ongoing assessment	Testing; attendance and independent student work (ISW): completion of written homework are taken into account.	1	3	28
	Midterm assessment	Testing	8	12	
Module 2					
General Physiology of Excitable Structures	Ongoing assessment	Testing; attendance and independent student work (ISW): completion of written homework are taken into account.	1	3	32
	Midterm	Colloquium	10	18	
Module 3					
Physiology of the Central Nervous System	Ongoing assessment	Testing; attendance and independent student work (ISW): completion of written homework are taken into account.	1	3	36
	Midterm assessment	Oral interview	9	14	
Module 4					
Physiology of the Autonomic Nervous System and Sensory Systems	Ongoing assessment	Testing; attendance and independent student work (ISW): completion of written homework are taken into account.	1	3	40
	Midterm assessment	Oral interview	9	14	
TOTAL for the semester			40	70	
Interim assessment (Pass)			20	30	
Semester rating for the discipline			60	100	

Technological Map of the Discipline
"Normal Physiology"

Course/semester: 2/3
Number of credits (credit units): 5
Assessment: examination

Discipline module name according to the Work Program	Assessment	Assessment format	Minimum passing score	Maximum passing score	Assessment schedule
Module 1					
Physiology of Blood Circulation and Lymph Circulation	Ongoing assessment	Testing, attendance, and independent student work (ISW): completion of written homework.	1	3	5
	Midterm assessment	Oral interview	8	15	
Module 2					
Physiology of Respiration	Ongoing assessment	Testing; attendance is taken into account. ISW: completion of written homework.	1	3	8
	Midterm assessment	Testing	8	11	
Module 3					
Physiology of Metabolism, Nutrition, Thermoregulation, and Excretion	Ongoing assessment	Testing; attendance is taken into account. ISW: completion of written homework.	1	3	10
	Midterm assessment	Testing	7	9	
Module 4					
Physiology of Digestion	Ongoing assessment	Testing; attendance and independent student work (ISW): completion of written homework are taken into account.	1	3	13
	Midterm assessment	Colloquium	6	10	
Module 5					
Physiology of Higher Nervous Activity	Ongoing assessment	Testing; attendance and independent student work (ISW): completion of written homework are taken into account.	1	3	16
	Midterm assessment	Testing	6	10	
TOTAL for the semester			40	70	
Interim assessment (Examination)			20	30	
Semester rating for the discipline			60	100	