MINISTRY OF HEALTH OF UKRAINE
KHARKIV NATIONAL MEDICAL UNIVERSITY

Department of Physiology
Training year 2021-2022

SYLLABUS OF EDUCATIONAL COMPONENT

«PHYSIOLOGY»

Normative educational component

Internal form of training

Training direction **22 «Health care»**

Specialty (specialization): **223 «Nursing»**

Educational and professional program: **«Nursing» 1st Bachelor's level of higher education**

Course **1** (4 years of study)

Syllabus of educational component was considered at the meeting of Physiology department

Protocol from
«30» of August 2021 № 16

Active head of Physiology department

L.V. Chernobay
(signature) (name, surname)

Approved by methodical commission of KhNMU on problems of natural science training

Protocol from
«31» of August 2021 № 1

Head

O. Yu. Vovk
(signature) (name, surname)

DEVELOPERS OF SYLLABUS:

1. Dmytro Marakushin, professor of Physiology department, D.Med.Sc., professor.
2. Larisa Chernobay, active head of Physiology department, PhD, associate professor.
3. Iryna Karmazina, responsible for organizational and methodical work of Physiology department for foreign students training, PhD, associate professor.

INFORMATION ABOUT TEACHERS PROVIDING TRAINING COMPONENT

Teaching stuff of Physiology department:

1. Dmytro Marakushin, director of ERI of International Citizens, professor of Physiology department, D.Med.Sc., di.marakushyn@knmu.edu.ua
2. Larysa Chernobay, active head of Physiology department, associate professor, PhD, lv.schernobay@knmu.edu.ua
3. Oksana Vasylieva, Dean of VII faculty for foreign students training, associate professor, PhD, ov.vasylieva@knmu.edu.ua
4. Inna Isaieva, responsible for international relations and scientific work of Physiology department, associate professor, PhD, im.isaieva@knmu.edu.ua
5. Iryna Karmazina, responsible for organizational and methodical work of Physiology department for foreign students training, secretary of Academic Council of ERI of International Citizens, associate professor, PhD, is.karmazina@knmu.edu.ua
6. Roman Alekseienko, responsible for educational activities of Physiology department, associate professor, PhD, rv.alekseienko@knmu.edu.ua
7. Olga Dunaieva, responsible for school of young educator of Physiology department, associate professor, PhD, ov.dunaieva1@knmu.edu.ua
8. Mykhailo Kirichenko, associate professor, PhD, mp.kyrychenko@knmu.edu.ua
9. Alina Goncharova, responsible for organization of distant learning of Physiology department, associate professor, PhD, av.goncharova@knmu.edu.ua
10. Nataliia Maslova, responsible for publishing activity of Physiology department, associate professor, PhD, nm.maslova@knmu.edu.ua
11. Oksana Bulynina, union committee representative of Physiology department, senior teacher, od.bulynina@knmu.edu.ua
12. Svitlana Shenger, secretary of training and methodical meetings of Physiology department, senior teacher, sv.shenher@knmu.edu.ua
13. Nataliia Hloba, responsible for work of student scientific club of Physiology department, assistant, ns.hloba@knmu.edu.ua
14. Nadiia Grygorenko, assistant, PhD, nv.hryhorenko@knmu.edu.ua

Information about teachers: professional interests include clinical and physiological direction of Physiology educational component with full horizontal and vertical integration. All training-methodical provision of training component is provided at the website of department https://knmu.edu.ua/departments/kafedra-fiziologiyi and in the system of Distant Training of KhNMU on Moodle platform https://distance.knmu.edu.ua/course/view.php?id=5251

Contact number and e-mail of Physiology department: 707-72-77, 707-73-76
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Information about consultations: ***Off-line consulting*** are carried out every day from 15:00 to 17:00 and on Saturdays from 9:00 to 15:00 (classrooms of Physiology department according to registration list formed by teachers and schedule of department). ***Online consultations***: according to registration of higher education seeker for work-offs in ASC system and further organization of rework by teachers in System of Distant Learning of KhNMU.

Location: KhNMU, TLB-3, 5th floor, Physiology department.

INTRODUCTION

The syllabus of educational component "Physiology" is compiled in accordance with the Educational and professional program (the “EPP”) “Nursing” and Standard of Higher Education of Ukraine (the "Standard") of the first (bachelor) level of higher education in the field of knowledge 22 Health care specialty 223 “Nursing”.

Description of the educational component (abstract).

Physiology as a basic educational component focuses on the training of highly qualified bachelor of nursing and is one of the most important subjects in the medical education system.

This program is based on the latest advances in medical and biological educational components.

Physiology as an educational component provides the training of bachelor of nursing who have a significant amount of theoretical and practical knowledge regarding the structural and functional features of the organism at various levels of its organization;

a) is based on higher education seekers' study of medical biology, medical and biological physics, medical chemistry, biological and bioorganic chemistry, morphological educational components and integrates with these educational components;

b) establishes the basis for higher education seekers to study pathophysiology and propaedeutics of clinical educational component, which involves the integration of teaching with this educational component and the formation of the ability to apply knowledge of physiology in the process of further training and professional activity;

c) lays the foundation for a healthy lifestyle and prevention of functional impairment in the process of life.

The subject of the study of the educational component is the functions of a living organism, their relationship with each other, regulation and adaptation to the external environment, origin and formation in the process of evolution and individual development of the individual.

Interdisciplinary relations: the educational component is based on the study of medical biology, Latin language, ethics, philosophy, ecology, medical and biological physics, medical chemistry, biological and bioorganic chemistry, morphological educational components and integrates with these educational components, laying the foundations for higher education seekers to study pathophysiology, pathomorphology, deontology and propaedeutics of clinical educational component, which involves the integration of teaching with these educational components and the formation of the ability to apply knowledge of physiology in the process of further training and professional activity; lays the foundation for a healthy lifestyle and prevents the disruption of the structure and functions in the process of life.

Educational component page in the Moodle system: Department of Physiology, course: Physiology / specialty 223 "Nursing" / 1st bachelor's level / 1 course
https://distance.knmu.edu.ua/course/view.php?id=5251

1. PURPOSE AND TASKS OF THE EDUCATIONAL COMPONENT

1.1. The purpose of the study of the educational component "Physiology" - the ultimate goals are set on the basis of bachelor of nursing training in the field of natural sciences and is the basis for constructing the content of the educational component. The description of goals is formulated through skills in the form of target tasks (actions). Based on the ultimate goals, each section formulated specific goals in the form of certain skills (actions), objectives, which ensure the achievement of the ultimate goal of studying the educational component.

The purpose of studying the educational component is to master knowledge about the objective laws of the functions of the organism, the interconnection of these functions, their changes under the influence of external and internal environments.

1.2. The main task of studying the educational component "Physiology" is the in-depth study of the mechanisms of vital activity of a healthy person in order to identify the causes and nature of violations of these mechanisms in various diseases, which makes physiology the theoretical basis of medicine.

1.3 Competence and learning outcomes, the formation of which is facilitated by educational component e (the relationship with the normative content of the training of higher education graduates, formulated in terms of the results of training in the EPP "Nursing").

1.3.1. According to the requirements of the standard, educational component ensures higher education seeker acquisition of following competences:

- **integral:**

A bachelor of nursing is able to solve complex specialized tasks and practical problems in the field of nursing or in the learning process, which involves the application of certain theories and methods of the relevant science and is characterized by the complexity and uncertainty of conditions.

- **general:**

GC 03. Ability to abstract thinking, analysis and synthesis.
GC 04. Ability to apply knowledge in practical situations.
GC 05. Knowledge and understanding of the subject area and understanding of professional activity.
GC 10. Ability to make informed decisions.

- **professional:**

PC 02. The ability to recognize and interpret signs of health and its changes, illness or disability (assessment/diagnosis), limitations of the possibility of full-fledged life activities, and to determine the problems of patients with various diseases and conditions.

PC 04. Application of professional skills (abilities), medical means, interventions and actions to ensure the patient/client's with dignity, privacy (intimacy), confidentiality, protection of his rights, physical, psychological and spiritual needs on the basis of transcultural nursing, tolerant and non-judgmental behavior.

PC 05. The ability to effectively apply a combination of nursing skills (abilities), medical supplies, interventions and actions to ensure care based on a holistic approach, taking into account the satisfaction of the patient's needs for comfort, nutrition, personal hygiene and the ability of the individuals to meet their daily needs.

PC 06. The ability to effectively apply a set of professional skills (abilities), medical supplies, interventions and actions in assessing the functional status of patients/clients, preparing them for diagnostic examinations and taking biological material for laboratory examinations.

PC 07. Preservation of specialist's own health in the implementation of care, performing manipulations and procedures, when moving and transporting the patient/client.

PC 08. Preventive activities of a nurse aimed at preserving and strengthening health, preventing diseases, informing, and educating the patient and his family members.

PC 12. The ability to orientate in determining the group belonging of drugs, the peculiarities of their pharmacokinetics and pharmacodynamics.

PC 13. The ability to identify the relationship between clinical manifestations of diseases and the results of additional methods of examinations.

PC 14. The ability to organize and provide emergency care in various acute conditions.

1.3.2. Studying the educational component ensures that higher education seekers acquire the following **program learning outcomes**

PLO 1. Conduct a nursing subjective and objective examination of various organs and systems of the patient and evaluate the obtained data.
In the conditions of health care facilities and at home, by communicating with patients of different ages, their relatives or close friends, a sick child and his parents, be able to collect complaints, disease history, life history, allergic history, epidemiological history, evaluate anamnestic data.

PLO 8. To perform medical manipulations in order to ensure a sanitary and anti-epidemic regime.

PLO 12. Correctly perform medical manipulations in order to take measures to stabilize the functional state of the body.

1.3.3. The study of the educational component ensures that higher education seekers acquire the following **social skills (Soft skills)**: creativity, intellectual development, sociability, the ability to work in a team, the ability to resolve conflicts, leadership, the ability to take responsibility, work in critical conditions, manage your time, understanding the importance of deadlines (timely performance of assigned tasks), the ability to think logically and critically, make independent decisions, etc.

As a result of studying the educational component the higher education seekers must know:

• Mechanism of formation of the state of physiological functions of the organism, its systems and organs.
• Age features of the body functions and their regulation.
• To know the parameters and make conclusions about the mechanisms of the nervous and humoral regulation of the physiological functions of the organism and its systems.
• The state of human health under different conditions based on physiological criteria.

Higher education seekers must be able:

• To interpret mechanisms and regularities of functioning of excitatory structures of an organism.
• Analyze the state of sensory processes in providing human life.
• Explain the physiological basis of the methods of studying the functions of the organism.
• Explain the mechanisms of the integrative activity of the organism.

2. INFORMATION VOLUME OF EDUCATIONAL COMPONENT

<table>
<tr><td rowspan="2">Indexes names</td><td rowspan="2">Branch of knowledge, direction of training, educational and qualification level</td><td>Characteristics of educational component</td></tr>
<tr><td>Form of education
Full-time</td></tr>
<tr><td>Number of credits – 5,5</td><td>Branch of knowledge
22 «Health care»</td><td>Normative</td></tr>
<tr><td rowspan="5">Total quantity of hours - 165</td><td rowspan="5">Specialty:
223 «Nursing»</td><td>Training year:</td></tr>
<tr><td>1st</td></tr>
<tr><td>Semester</td></tr>
<tr><td>I / II</td></tr>
<tr><td>Lectures</td></tr>
<tr><td rowspan="10">Quantity of hours for full-time training:
Class hours – 90
Individual work - 75</td><td rowspan="10">Educational and qualification level:
first (bachelor) level of higher education,
Professional qualification
«Bachelor of Nursing»
EPP «Nursing»</td><td>32 hours</td></tr>
<tr><td>Practical classes and seminars</td></tr>
<tr><td>58 hours</td></tr>
<tr><td>Laboratory classes</td></tr>
<tr><td>--- hours</td></tr>
<tr><td>Individual work</td></tr>
<tr><td>75 hours</td></tr>
<tr><td>Individual tasks:
--- hours.</td></tr>
<tr><td>Type of control:
exam</td></tr>
</table>

2.1 Description of the educational component

2.2.1 Lectures

№	Topic	Hours	Types of lectures
1	General notions of Physiology. Subject and methods of Physiology. Membrane theory. General physiology of excitable tissues. Rest potential. Action potential.	2	introductory, informative, thematic
2	Physiological mechanism of conduction of nervous impulses.	2	Thematic, informative
3	Modern notions of muscle contraction and relaxation. Muscle fatigue.	2	Thematic, informative
4	Integrative functions of CNS. Physiology of the neurons and their connections.	2	Thematic, informative
5	Central regulation mechanisms of motor functions. The role of spinal Cord in regulation of motor functions. The role of brainstem in regulation of muscle tone and motor functions.	2	Thematic, informative
6	The role of forebrain and Cerebellum in regulation of motor functions.	2	Thematic, informative
7	Central regulation mechanisms of visceral functions.	2	Thematic, informative
8	Physiology of Endocrine System.	2	Thematic, informative
9	Physiology of sensory systems. Somato-sensory system. Physiology of pain. Physiology of visual and auditory sensory systems.	2	Thematic, informative
10	High nervous activity. Processes of condition reflexes formation and inhibition Typological properties of the human nervous system activity. Functional system of behavior formation. Role of needs, motivations and emotions.	2	Thematic, informative
11	General characteristic of system of blood. Blood as an internal environment of organism, method and means of transport. Physiology of erythrocytes. Protective functions of blood – physiology of leukocytes. Blood groups.	2	Thematic, informative
12	Vascular-platelet and coagulation hemostasis. Role of anticoagulants and plasmins	2	Thematic, informative
13	System of circulation. Physiological properties of myocardium. Heart pumping function, regulation of cardiac activity. Role of vessels in hemodynamics. The main laws of hemodynamics – arterial pressure, arterial and venous pulse Regulation of systemic circulation	2	Thematic, informative
14	System of respiration. The main stages of respiration. Gases exchange in lungs and tissues. Gases transport by blood Regulation of respiration	2	Thematic, informative
15	System of digestion. The role of gustatory and olfactory sensory systems. Digestion in oral cavity and	2	Thematic, informative

	stomach. Digestion in duodenum, intestinal digestion and mechanisms of absorption		
16	System of excretion. Mechanism of urine formation. Regulation of urine formation and excretion. Role of kidneys in homeostasis maintenance	2	Thematic, informative
	Total hours	**32**	

2.2.2 Seminar classes

Seminar classes are not included in the curriculum.

2.2.3 Practical classes

№	Topic	Hours	Methods teaching	Forms control
1	Object and tasks of physiology. Methods of physiology researches. Registration of rest potential and action potential of nervous and muscular fibers. Research of excitation conduction by nervous fibers and nervous-muscular synapse. Research of the action potential of integral nerves and muscles. Research of skeletal muscles contraction mechanisms.	4	Verbal, visual, practical: demonstration, presentation, solution of situational problems using interactive teaching methods.	Oral and written (individual Frontal poll; programmed test control, creative tasks; individual tasks; abstracts; mutual control; self-control; report; declamation
2	General description of the biological control. Research of reflex arch. Research of excitation and inhibition processes in central nervous system	4	Verbal, visual, practical: demonstration, presentation, solution of situational problems using interactive teaching methods.	Oral and written (individual Frontal poll; programmed test control, creative tasks; individual tasks; abstracts; mutual control; self-control; report; declamation
3	Research of spinal cord role, brainstem, cerebellum and forebrain in control of motive functions of organism.	4	Verbal, visual, practical: demonstration, presentation, solution of situational problems using interactive teaching methods.	Oral and written (individual Frontal poll; programmed test control, creative tasks; individual tasks; abstracts; mutual control; self-control; report; declamation
4	Research of nervous control mechanisms of visceral functions of organism.	4	Verbal, visual, practical: demonstration, presentation, solution of	Oral and written (individual Frontal poll; programmed test control, creative tasks;

			situational problems using interactive teaching methods.	individual tasks; abstracts; mutual control; self-control; report; declamation
5	Research of humoral control of visceral functions of organism.	4	Verbal, visual, practical: demonstration, presentation, solution of situational problems using interactive teaching methods.	Oral and written (individual Frontal poll; programmed test control, creative tasks; individual tasks; abstracts; mutual control; self-control; report; declamation
6	Research of somatosensory system. Research of visual and auditory sensory systems. Research of vestibular, gustation and olfactory sensory systems.	4	Verbal, visual, practical: demonstration, presentation, solution of situational problems using interactive teaching methods.	Oral and written (individual Frontal poll; programmed test control, creative tasks; individual tasks; abstracts; mutual control; self-control; report; declamation
7	General mechanisms of formation and inhibition of conditioned reflexes. Peculiarities of higher nervous activity in men. Behavioral components of adaptation to external environment, physical and social factors. Types of higher nervous activity. Memory, emotions, motivations as a components of behavioral reactions.	4	Verbal, visual, practical: demonstration, presentation, solution of situational problems using interactive teaching methods.	Oral and written (individual Frontal poll; programmed test control, creative tasks; individual tasks; abstracts; mutual control; self-control; report; declamation
8	**Attestation class** ***"General principles of functions regulation. High integrative functions. Sensory systems"***	4	Verbal, visual, solutions to situational problems.	Programmed test control, oral survey
9	Functions of blood, physical and chemical properties of blood. Physiology of erythrocytes. Protective functions of blood – physiology of leukocytes. Blood groups. Types and physiological mechanisms of hemostasis	4	Verbal, visual, practical: demonstration, presentation, solution of situational problems using interactive teaching methods.	Oral and written (individual Frontal poll; programmed test control, creative tasks; individual tasks; abstracts; mutual control; self-control; report; declamation

	in case of vessel wall damage. Physiology of platelets.			
10	General characteristics of functional system of circulation. Physiological properties of myocardium. Physiological basis of electrocardiography. Heart pumping function and its role in hemodynamics. Phenomena accompanying cardiac activity. Heart sounds. Neural and humoral regulation of cardiac activity.	4	Verbal, visual, practical: demonstration, presentation, solution of situational problems using interactive teaching methods.	Oral and written (individual Frontal poll; programmed test control, creative tasks; individual tasks; abstracts; mutual control; self-control; report; declamation
11	Systemic blood pressure, laws of hemodynamics, role of vessels in circulation. Arterial pressure, arterial pulse, venous pulse. Regulation of circulation: 1) regulation of vascular tone; 2) regulation of systemic circulation; 3) regional circulation and its regulation. Physiology of lymphatic circulation.	4	Verbal, visual, practical: demonstration, presentation, solution of situational problems using interactive teaching methods.	Oral and written (individual Frontal poll; programmed test control, creative tasks; individual tasks; abstracts; mutual control; self-control; report; declamation
12	General characteristics of system of respiration. External respiration. Gases exchange in lungs. Transport of gases by blood. Regulation of respiration.	4	Verbal, visual, practical: demonstration, presentation, solution of situational problems using interactive teaching methods.	Oral and written (individual Frontal poll; programmed test control, creative tasks; individual tasks; abstracts; mutual control; self-control; report; declamation
13	General characteristic of system of digestion. Digestion in oral cavity. Role of gustatory and olfactory sensory systems. Digestion in stomach. Digestion in duodenum. Role of pancreatic juice and bile in processes of digestion. Physiology of intestinal digestion. Physiological basis of hunger and satiety. Regulation of system of nutrition.	4	Verbal, visual, practical: demonstration, presentation, solution of situational problems using interactive teaching methods.	Oral and written (individual Frontal poll; programmed test control, creative tasks; individual tasks; abstracts; mutual control; self-control; report; declamation

	Energy exchange and methods of its research. Body temperature and regulation of its constancy.			
14	General characteristic of system of excretion. Role of kidneys in excretory processes, mechanisms of urine formation and excretion. Role of kidneys in homeostasis maintenance.	4	Verbal, visual, practical: demonstration, presentation, solution of situational problems using interactive teaching methods.	Oral and written (individual Frontal poll; programmed test control, creative tasks; individual tasks; abstracts; mutual control; self-control; report; declamation
15	**Attestation class:** "Physiology of visceral systems –blood, circulation, respiration digestion, energy exchange and thermoregulation, excretion"	2	Verbal, visual, solutions to situational problems.	Programmed test control, oral survey.
	Total hours	**58**		

2.2.4. laboratory classes

laboratory classes are not included in the curriculum.

2.2.5. Individual work

№	Topic	Hours	Methods teaching	Forms control
1	History of the development of physiology in the XIX century. Contribution of works of I.M. Sechenov, IP Pavlov, Yu.V. Chagovets, P.G. Kostyuk in the development of world physiology. Ukrainian Physiology School	4	Study and analysis of basic and auxiliary literature, video clips, video films, Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.	Verification of completed methodological recommendations for independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self-control
2	Membrane resting potential (PS), mechanisms of origin, registration methods, FP parameters. Physiological role of PS. Potential of action (PD), mechanisms of origin, registration methods, phase of PD, parameters of	4	Study and analysis of basic and auxiliary literature, video clips, video films, Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.	Verification of completed methodological recommendations for independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self control

	PD. Physiological role of PD. Conduction of excitation by nerve fibers and through the neuromuscular synapse. Properties of skeletal muscles and mechanisms of their contraction			
3	Study of fatigue and recovery during muscular work and adaptation of the body to physical activity.	4	Study and analysis of basic and auxiliary literature, video clips, video films, Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.	Verification of completed methodological recommendations for independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self control
4	Circuits of biological regulation of functions. Reflex principle of the central nervous system activity. Synapses of the central nervous system. Excitation and inhibition in the central nervous system	4	Study and analysis of basic and auxiliary literature, video clips, video films, Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.	Verification of completed methodological recommendations for independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self control
5	The role of central nervous system in the regulation of motor functions.	4	Study and analysis of basic and auxiliary literature, video clips, video films, Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.	Verification of completed methodological recommendations for independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self control
6	The role of the autonomic nervous system in the regulation of visceral functions.	4	Study and analysis of basic and auxiliary literature, video clips, video films, Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.	Verification of completed methodological recommendations for independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self control
7	Humoral regulation and the role of endocrine glands in	4	Study and analysis of basic and auxiliary literature, video clips,	Verification of completed methodological

	the regulation of visceral functions.		video films, Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.	recommendations for independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self control
8	Somatosensory system. Physiological bases of pain and anesthesia.	4	Study and analysis of basic and auxiliary literature, video clips, video films, Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.електронній формі.	Verification of completed methodological recommendations for independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self control
9	Auditory, taste and olfactory sensory system.	4	Study and analysis of basic and auxiliary literature, video clips, video films, Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.	Verification of completed methodological recommendations for independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self control
10	Higher integrative functions of the nervous system Physiological bases of behavior. Memory and learning	4	Study and analysis of basic and auxiliary literature, video clips, video films, Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.	Verification of completed methodological recommendations for independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self control
11	Functions of blood, physical and chemical properties of blood. Protective blood functions. Blood groups. Physiology of leukocytes. Types and mechanisms of hemostasis. Physiology of platelets.	4	Study and analysis of basic and auxiliary literature, video clips, video films, Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.	Verification of completed methodological recommendations for independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self control
12	Physiological properties of cardiac muscle. Regulation of the cardiac	4	Study and analysis of basic and auxiliary literature, video clips, video films,	Verification of completed methodological recommendations for

	activity. Systemic circulation. The laws of hemodynamics, the role of blood		Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.	independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self control
13	Features of regional blood circulation and its regulation. Dynamics of lymph circulation	4	Study and analysis of basic and auxiliary literature, video clips, video films, Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.	Verification of completed methodological recommendations for independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self control
14	Gas exchange in the lungs Transport of gases by blood.	4	Study and analysis of basic and auxiliary literature, video clips, video films, Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.	Verification of completed methodological recommendations for independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self control
15	Digestion in the oral cavity. The role of taste and olfactory sensory systems. Physiological basis of hunger and satiety.	4	Study and analysis of basic and auxiliary literature, video clips, video films, Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.	Verification of completed methodological recommendations for independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self control
16	The role of the kidneys in the processes of excretion, mechanisms of urine formation.	4	Study and analysis of basic and auxiliary literature, video clips, video films, Search, mastery of knowledge. Implementation tasks in written, printed or electronic form.	Verification of completed methodological recommendations for independent training of higher education seekers. Oral survey; creative tasks; individual tasks; abstracts; self control
15	Preparation for the final attestation classes.	11	Study and analysis of basic and auxiliary literature, video clips, video films, Search, mastery of knowledge. Implementation tasks in written, printed or	Verification of completed methodological recommendations for independent training of higher education seekers.

			electronic form.	
	Total hours	**75**		

3. EVALUATION CRITERIA

3.1. The evaluation of the educational success of education seekers is carried out on the basis of the current **"Instructions for evaluating the educational activity of education seekers of the KNMU",** approved by the order of the KNMU dated **August 21, 2021. №181**

Evaluation of the success of higher education seekers' training in the ECTS of the organization of the educational process (CTA and exam) in the educational component «Physiology" Assessment of Current Training Activities (CTA).

Recalculation of the average mark for current activity in a multi-point scale

Is conducted in accordance with the "Instructions for the assessment of educational activities".

When assessing the mastering of each educational component subject (CTA) and the final attestation (FA), the higher education seekers is evaluated according to the traditional 4-point system: "excellent", "good", "satisfactory" and "unsatisfactory".

The final score for the current training activity (CTA) and the final attestation (FA) is defined as the arithmetic average of the traditional estimates for each class and software rounded to 2 decimal signs and converted to a multi-point scale according to Table 1.

The recalculation of the average score for the CTA and FS for the "Physiology" educational component, which ends with the exam, is conducted in accordance with Table 1. The minimum number of points to be scored by the higher education seeker for admittance to the examination is 70 points, the minimum score for the exam is 50, respectively.

Table 1.

Recalculation of the average mark for current activity in a multi-point scale (for educational components that end with exam)

4-points scale	200- points scale	4- points scale	200- points scale
5	120	3.91-3,94	94
4.95-4,99	119	3.87-3,9	93
4.91-4,94	118	3.83- 3,86	92
4.87-4,9	117	3.79- 3,82	91
4.83-4,86	116	3.74-3,78	90
4.79-4,82	115	3.7- 3,73	89
4.75-4,78	114	3.66- 3,69	88
4.7-4,74	113	3.62- 3,65	87
4.66-4,69	112	3.58-3,61	86
4.62-4,65	111	3.54- 3,57	85
4.58-4,61	110	3.49- 3,53	84
4.54-4,57	109	3.45-3,48	83
4.5-4,53	108	3.41-3,44	82
4.45-4,49	107	3.37-3,4	81
4.41-4,44	106	3.33- 3,36	80
4.37-4,4	105	3.29-3,32	79
4.33-4,36	104	3.25-3,28	78
4.29-4,32	103	3.21-3,24	77
4.25- 4,28	102	3.18-3,2	76
4.2- 4,24	101	3.15- 3,17	75
4.16- 4,19	100	3.13- 3,14	74
4.12- 4,15	99	3.1- 3,12	73
4.08- 4,11	98	3.07- 3,09	72
4.04- 4,07	97	3.04-3,06	71
3.99-4,03	96	3.0-3,03	70
3.95- 3,98	95	Below 3	Unsatisfactory

Evaluation of the final lesson

The final attestation (hereinafter referred to as the "FA") is necessarily conducted in accordance with the working educational program of the educational component (hereinafter - WEPD) during the semester according to the schedule, during the classes.

Assessment of FA is carried out by the teacher of the academic group or by the exchange of adjacent groups between the teachers.

The department provides the following materials for preparation for the FA on the information stand:

- Basic and anchor test assignments of licensed exam "Krok-B";
- a list of theoretical questions (including topics of individual work);
- a list of practical skills;
- list of drugs, recipes to be prescribed by the higher education seeker;
- list of accounting medical documents;
- criteria for assessing the knowledge and skills of higher education seekers;
- a schedule for higher education seeker work-offs of missed lessons during the semester.

Conducting the final attestation:

1. Solving a set of test tasks in the content of the training material, which includes the following:
- basic test tasks on educational component covering the contents of the training material of the final lesson in accordance with the WEPD in the amount of not less than 30 tests (for the educational components that are part of the licensed exam "Krok-B" - an open base of test tasks of the LE "Krok-B." The evaluation criterion is 90,5% of correctly solved tasks; "passed" or "failed");
2. Evaluation of mastering of practical skills (evaluation criteria - "fulfilled" or "failed");
3. During the assessment of higher education seeker's knowledge of the theoretical issues included in this final session, a higher education seeker is presented with a traditional assessment, which is converted into a multi-scale scale, along with estimates for the CTA (Table 1).

Conducting and evaluating the exam on the educational component "Physiology".

Exam on the educational component "Physiology" is a process during which the following parameters are checked:

- level of theoretical knowledge;
- development of creative thinking;
- independent work skills;
- competence - the ability to synthesis the knowledge and apply them in solving practical problems.

The exam is scheduled for the session, approved by the rector of the KhNMU, specifying the exact dates of the examinations that are scheduled beyond the semester.

If the exam is not completed, the dates of retraining during the holidays are set, before the beginning of the next semester.

Examination:

The Department of Physiology, taking into account the membership in natural science training, approves the methodology of conducting the exam and approves it in the work curriculum on educational component in the prescribed manner:

1. It is recommended to solve the test task package at the last or penultimate semester, which includes the basic (anchor) test tasks of the LE “Krok-B” in the amount of not less than 30 tests. The criterion of evaluation - 100% of correctly solved problems, "made up - did not make up", is the criterion of admission to the exam.
2. Assessment of the acquisition of practical skills and theoretical knowledge in all subjects of educational component on the day of the examination (Table 2)

Assessment of practical skills is carried out according to the criteria "fulfilled", "not fulfilled". The evaluation of theoretical knowledge is carried out according to Table 2.

Table 2

Assessment of theoretical knowledge if practical skills are evaluated according to the criteria "fulfilled", "not fulfilled"

Questions	«5»	«4»	«3»	Oral answer according to question cards including	Gor each answer higher education seeker gets from 10 to
1	16	13	10		

2	16	13	10	theoretical part of educational component	16 points that is evaluated as following: «5» - 16 points; «4» - 13 points; «3» - 10 points
3	16	13	10		
4	16	13	10		
5	16	13	10		
	80	65	50		

Score for the educational component

Educational component "Physiology" is studied during 2 semesters, therefore, the assessment from educational component is defined as the average arithmetic mean of the CTA for all semesters during which the educational component was studied, which is transferred to the 120-point scale of the ECTS (Table 1) with the addition of scores obtained directly on examinations

The maximum number of points a higher education seeker can score for studying a educational component is 200 points, including the maximum number of points for the current training activity - 120 points, and the maximum number of points on the exam - 80 points. The minimum number of points is 120, including the minimum current training activity - 70 and the exam results - 50 points.

Assessment of higher education seekers 's individual tasks

At the session of the department, a list of individual tasks (participation with reports in student conferences, profile competitions, preparation of analytical reviews with presentations) with the determination of the number of points for their implementation, which can be added as incentive (no more than 10), must be approved.

Points for individual tasks are charged to the higher education seeker only on a commission basis (commission - the head of the department, the head teacher, the teacher of the group) only under the conditions of their successful implementation and protection. The total score for the CTA can not exceed 120 points.

Assessment of independent work of higher education seekers

Assimilation of those topics that are issued only for independent work, is checked during the final session and examination.

Technology of evaluation of educational component

Assessment of the results of studying the educational component is carried out directly during the exam. The score from the educational component is defined as the sum of the points for the CTA and the exam and ranges from min-120 to max-200. The correspondence of the marks on the 200-point scale, the four-point (national) scale and the scale of ECTS is given in Table 3.

Table 3

Conformity of grades on 200-point scale, four-point (national) scale and ECTS scale

Grade on 200-point scale	Grade on ECTS scale	Grade on four-point (national) scale
180–200	A	Excellent
160–179	B	Good
150–159	C	Good
130–149	D	Satisfactory
120–129	E	Satisfactory
Below 120	F, Fx	Unsatisfactory

The assessment of the educational component is offered only to those higher education seekers, who are enrolled in all final classes and exam.

higher education seekers who fail to meet the requirements of curriculum of educational components are rated F_X if they were admitted to the exam but did not complete it. The F score is awarded to higher education seekers who are not admitted to the exam.

After completing the study of educational component, the stuff responsible for the organization of teaching and methodological work at the department or the teacher put the higher education seeker the appropriate score according to scales (Table 3) in the credit book and fill out the progress of the higher education seekers in the educational component in the form of Y-5.03B - exam.

3.2. Theoretical questions for exam preparation

I. PHYSIOLOGY OF EXCITABLE TISSUES

1. Irritability and excitability as the base of tissues reactions in response to the irritation.
2. Modern conceptions about structure and functions of cell membranes.
3. Transmembrane transport. Membranes' ionic channels; their kinds and functions. Membranes' ionic pumps, their functions. Cell ionic gradients – ionic asymmetry. Membrane receptors, their functions.
4. Membrane rest potential (RP); mechanism of its origin; methods of its registration; parameters of RP; physiological significance of RP.
5. Action potential (AP), mechanism of its origin, methods of its registration; phases of AP; parameters of AP. Physiological role of AP.
6. Cell excitability changes during excitation conducting. Absolute and relative refractory periods. Mechanism of their origin; their physiological significance.
7. Changes of membrane potential (RP) under the action of electric current as an irritative factor. Local response. Critical depolarization level. Depolarization thresholds as a measure of excitation. Descriptions of «strength-duration» diagram.
8. Physiological properties of nerve fibers.
9. Mechanisms of nerve impulse conduction by myelinated and unmyelinated fibers.
10. The laws of excitation conduction along nerve fibers, the rate and the factors of excitation conduction.
11. Particularities of nerve fibers relating to A, B, C types.
12. Nervous-muscular synapse. End-plate potential. Physiological mechanisms of nerve-muscular synapse blockage.
13. Physiology of muscles. Mechanisms of skeletal muscles contraction and relaxation. Mechanisms of excitation-contraction coupling of muscle fibers.
14. Skeletal muscles functions and physiological properties. The types of muscle fibers. The types of muscle contraction in dependence of irritation frequency: single and tetanic. The types of muscle contraction in dependence of its length and tension: isometric and isotonic. Dependence between muscle fiber length and its tension.
15. Dependence between the velocity of muscle contraction and its load.
16. Electromyography.
17. Muscle strength and work. Dynamometry. Energetic balance of muscle contraction.

II. NEURONAL AND HUMORAL REGULATION

1. Give definition of reflex. Draw the principle scheme of reflex and characterize all its components.
2. Excitation process in the CNS. Draw the scheme and explain the mechanism.
3. Give definition of nervous center. List properties of nervous centers. Draw the scheme of facilitation and occlusion, and explain these phenomena. Draw the scheme of convergence and divergence, and explain these phenomena.
4. Inhibition process in the CNS. Primary inhibition, its mechanism and functions. Types of postsynaptic inhibition and their significance. Draw the scheme of postsynaptic inhibition and explain its mechanism. Draw the scheme of presynaptic inhibition and explain its mechanism. Secondary inhibition, its mechanism and functions.
5. Central synapses. Their classification. Inhibitory and excitatory neurotransmitters.
6. Proprioceptive myotatic reflexes of spinal cord. Draw the scheme and explain functions of γ-loop.
7. Reflex function of spinal cord. Superficial reflexes which are used for topic diagnostic of spinal cord. Draw the scheme of exteroceptive reflex.
8. Proprioceptive tendon reflexes of spinal cord which are used in clinical examination. Draw the scheme of monosynaptic reflex arch.
9. Structural and functional characteristics of ascending tracts of spinal cord. Draw the schemes to illustrate your answer.
10. Spino-thalamic tracts. Draw the scheme and describe their functions.
11. Spino-cerebellar tracts. Draw the scheme and describe their functions.
12. Spino-cortical pathways. Draw the scheme, and explain their functions.
13. Descending pathways. Draw schemes and describe their functions.

14. List ascending and descending pathways of brainstem and describe their functions. Brainstem role in control of flexor and extensor muscles.
15. Descending tracts of brainstem controlling flexor and extensor muscles tone. Draw the scheme to illustrate your answer.
16. List the motor and sensory nuclei of brainstem, their localization and functions.
17. Decerebrate rigidity. Static reflexes of brainstem.
18. Statokinetic reflexes of brainstem, their functions.
19. Orientation reflexes of brainstem.
20. Anatomical structure of cerebellum. Afferent and efferent connections of flocculo-nodular lobe and vermis of cerebellum. Their role in control of motive function. Afferent and efferent connections of intermediate zone of cerebellum. Its role in control of motive function. Lateral zone of cerebellum. Its afferent and efferent connections. Role of cerebellum and basal ganglia in formation of purposeful behavior.
21. Neuronal organization of cerebellar cortex. Functions of deep nuclei of cerebellum.
22. Symptoms of cerebellar lesion.
23. List anatomical structures involved into the striopallidary system. Draw the scheme and show their intercommunications.
24. Role of basal ganglia in formation of purposeful behavior.
25. Symptoms of striopallidary system lesion.
26. Comparative characteristics of somatic and autonomic nervous systems.
27. Structural and functional characteristics of parasympathetic division of autonomic nervous system. Draw the scheme of its reflex arch.
28. Structural and functional characteristics of sympathetic nervous system. Draw the scheme of its reflex arch.
29. Cholinergic system of organism: cholinoreceptors, their effects, agonists and antagonists. Localization of cholinoreceptors in different organs.
30. Adrenoergic system of organism: adrenoreceptors, their effects, agonists and antagonists. Localization of adrenoreceptors in different organs.
31. Hypothalamic hormones. Their functions.
32. Hormones of adenohypophysis. Their functions.
33. Hormones of neurohypophysis. Their functions. Intercommunication with hypothalamus.
34. Hypothalamo-hypophyseal-adrenal system. Its role in organism adaptation to stress.
35. Humoral regulation of mental development.
36. Humoral regulation of body linear growth and physical development.
37. Humoral regulation of homeostasis.
38. Hormones of thyroid glands. Their biological effects. Hyper- and hypofunction of thyroid glands
39. Humoral regulation of sexual functions.
40. Role of pancreatic hormones in regulation of homeostasis. Negative and positive feedback control of hormones secretion.

III. PHYSIOLOGY OF SENSORY SYSTEMS & HIGHER NERVOUS ACTIVITY

1. General principles of sensory systems (analyzers) structure; physiological significance of analyzer's departments.
2. Classification of receptors. Primary and secondary sensitive receptors. Mechanism of receptors excitation. Sensory transduction and encoding. Adaptation of receptors.
3. Conduction department of sensory system. Specific and nonspecific conduction pathways. Role of thalamus and reticular formation nuclei in formation of sensation and perception.
4. Central department of analyzer. Localization and functions of primary, secondary and tertiary areas of cortex hemispheres.
5. Classification of somatic sensations. Receptors of somatosensory system, their functions.
6. Conduction department of somatosensory system. Draw the scheme of conduction pathways transmitting proprio- and exteroceptive sensitivities from trunk and limbs. Conduction of exteroceptive sensitivity from the face, head and oral cavity.
7. Cortical department of somatosensory system: localization, topographic organization, and peculiarities.

8. Pain sensory system. Classification of pain. Pain receptors. Conduction pathways and cortical department of pain sensory system. Mechanism of referred pain. Analgesia system.
9. Anatomical structure of organ of vision. Functional characteristics of its elements.
10. Receptive part of visual sensory system. Structure of retina; its photoreceptors and neural organization. Peculiarities of structure and functions of fovea centralis and blind sport.
11. Structure of photoreceptors. Photochemistry of vision. Mechanism of rods and cones excitation. Light and dark adaptation of photoreceptors.
12. Draw the scheme of visual pathways. Define their structural components. Defects of visual fields caused by impairment at different levels of visual pathways.
13. Organization and functions of visual cortex.
14. Draw the scheme of reflex arch of myosis. Explain the consensual reaction of eyes.
15. Draw the scheme of reflex arch of mydriasis. Explain the consensual reaction of eyes.
16. Draw the scheme of reflex arch of crystalline lens accommodation.
17. Reflex of visual axis convergence.
18. Modern theories of color vision.
19. Methods of visual acuity examination. Abnormalities of eyes refraction and their correction.
20. Peripheral department of auditory sensory system: structure and functions of external, middle and inner ear. Reflex arch and significance of acoustic (tympanic) reflex.
21. Functional anatomy of cochlea. Localization and structure of organ of Corti. Mechanism of phonoreceptors excitation.
22. Conception of sound waves perception: “place principle”.
23. Conduction department of auditory sensory system: auditory pathways and their projections.
24. Cortical department of auditory analyzer. Localization and functions of primary and secondary auditory cortexes. Role of hearing in formation speech.
25. Peripheral department of vestibular sensory system. Role of labyrinthine receptors in detection of linear and rotational acceleration.
26. Structure of otolith organs, mechanism of their receptors excitation and inhibition. Response to the linear acceleration. Significance of otolithic apparatus.
27. Functional anatomy of semicircular ducts, mechanism of their receptors excitation and inhibition. Response to the rotational acceleration. Adaptation of ampular receptors.
28. Conduction pathways of vestibular sensory system. Role of vestibular nuclei in maintenance of equilibrium. Main projections of vestibular nuclei to other regions of the brain.
29. Chemical senses. Role of gustatory and olfactory sensory systems in digestion.
30. Functional anatomy of organ of taste. Taste specificity of gustatory receptors. Mechanism of gustatory receptors excitation.
31. Conduction pathways of gustatory sensory system.
32. Cortical department of gustatory sensory system.
33. Peripheral department of olfactory sensory system. Mechanism of olfactory receptors excitation.
34. Conduction and cortical department of olfactory sensory system.
35. Define the lower and higher nervous activity. Comparative characteristics of inborn and acquired forms of behavior.
36. Draw and explain the principle scheme of conditioned reflexes formation. Rules of conditioned reflexes formation. Mechanism of temporal-spatial connection during formation of conditioned reflex.
37. Types of central inhibition. Their significance for human higher nervous activity.
38. Mechanism and biological significance of unconditioned (external) inhibition of conditioned reflexes.
39. Mechanism and biological significance of conditioned (internal) inhibition of conditioned reflexes.
40. Types of human HNA.
41. Functional representation of cortex hemispheres: localization of main gnostic and praxis areas.
42. Functional anatomy of limbic system. Role of limbic system in formation of purposeful behavior.
43. First and second signal systems. Physiological basis of speech.
44. Modern conceptions of memory formation. Classification of memory. Consolidation of memory.
45. Needs and motivations as inner determinants of behavior.

46. Physiological basis of sleep. Phases of sleep, their characteristics. Bioelectrical activity of the brain during sleeping.

IV. FUNCTIONAL SYSTEM OF BLOOD

1. General characteristic of blood system. Composition and functions of blood. Concept of homeostasis.
2. Electrolytes of blood plasma. Osmotic blood pressure and its regulation.
3. Proteins of blood plasma, their functional meaning. Erythrocyte sedimentation rate (ESR).
4. Oncotic blood pressure and its role.
5. Acid-base balance of blood, the role of blood buffer systems in maintaining its constancy.
6. Erythrocytes, their functions. Regulation of erythropoiesis.
7. Types of hemoglobin and its compounds, their physiological role.
8. Leukocytes, their functions. Regulation of leucopoiesis. Physiological leukocytosis.
9. Platelets, their physiological role.
10. Vascular-platelet hemostasis, its mechanisms and physiological meaning.
11. Coagulation hemostasis, its mechanisms and physiological meaning.
12. Coagulants, anticoagulants, fibrinolysis factors, their physiological meaning.
13. Physiological characteristic of ABO blood system. Conditions of blood compatibility of donor and recipient. Tests before blood transfusions.
14. Physiological characteristic of blood rhesus system. The meaning of rhesus belonging during blood transfusions and pregnancy.

V. FUNCTIONAL SYSTEM OF CIRCULATION

1. General characteristic of circulation system. Factors providing blood flow in vessels, direction and continuity of blood flow.
2. Automaticity of heart. Gradient of automaticity. Stanius experiment.
3. Action potential of atypical cardiac muscle cells of sinoatrial node, mechanisms of its origin, physiological role.
4. Conducting system of heart. Order and speed of excitation conduction in heart.
5. Action potential of typical cardiac muscle cells of ventricles, mechanisms of its origin, physiological role. Time correlation of AP and single muscle contraction of myocardium.
6. Refractory periods during development of AP of typical cardiac muscle cells, their meaning.
7. Interfacing of excitation and conduction in myocardium. Mechanisms of contraction and relaxation of myocardium.
8. Vector theory of ECG forming. ECG leads. Origin of ECG waves, segments and intervals.
9. Cardiac cycle, its phases, their physiological meaning.
10. Role of heart valves. Heart sounds, mechanisms of their origin. PCG, its analysis.
11. Arterial pulse, its origin. SPG, its analysis.
12. Myogenic mechanisms of heart activity regulation.
13. Character and mechanisms of influence of sympathetic nerves on heart activity. Role of sympathetic reflexes in regulation of heart activity.
14. Character and mechanisms of influence of parasympathetic nerves on heart activity. Role of parasympathetic reflexes in regulation of heart activity.
15. Humoral regulation of heart activity. Dependence of heart activity from changes of blood ion composition.
16. Peculiarities of structure and functions of different segments of blood vessels. The main law of hemodynamics.
17. Meaning of blood viscosity in blood circulation.
18. Linear and volume velocity of blood flow in different segments of blood-vascular system. Factors influencing their values.
19. Blood pressure and its changes in different segments of blood-vascular system.
20. Arterial blood pressure, factors that determine its value. Methods of registration of arterial blood pressure.
21. Blood circulation in capillaries. Mechanisms of fluid exchange between blood and tissues.
22. Blood circulation in veins, gravitation influence on it. Factors that determine the value of venous pressure.
23. Tone of arterioles and venules, its meaning. Influence of vasomotor nerves on vascular tone.

24. Myogenous and humoral regulation of vascular tone. Role of substances produced by vascular endothelium in regulation of vascular tone.
25. Hemodynamics center. Reflex regulation of vascular tone. Pressor and depressor reflexes.
26. Reflex regulation of blood circulation during body position change in space (orthostatic test).
27. Regulation of blood circulation during muscle work.
28. Peculiarities of blood circulation in brain vessels and its regulation.
29. Peculiarities of blood circulation in heart vessels and its regulation.
30. Peculiarities of blood circulation in lungs vessels and its regulation.
31. Mechanisms of lymph forming. Lymph movement in vessels.

VI. FUNCTIONAL SYSTEM OF RESPIRATION

1. General characteristic of respiratory system. Main stages of breathing. Biomechanics of inspiration and expiration.
2. Elastic traction of lungs, negative pressure in pleural fissure.
3. External respiration. Indexes of external respiration and their assessment.
4. Anatomical and physiological "dead space", its physiological role.
5. Diffusion of gases in lungs. Diffusion ability of lungs and factors it depends on.
6. Transport of oxygen by blood. Oxygen capacity of blood.
7. Oxyhemoglobin dissociation curve, factors that influence it.
8. Transport of carbon dioxide by blood. Role of erythrocytes in transport of carbon dioxide.
9. Physiological role of airways, regulation of their lumen.
10. Respiratory center, its structure, regulation of breath rhythm.
11. Mechanism of first inspiration of a newborn.
12. Role of pulmonary stretch receptors and afferent fibers of vagus nerves in respiration regulation.
13. Role of central and peripheral chemoreceptors in respiration regulation. Blood components that stimulate external breathing.
14. Regulation of external breathing during physical load.

VII. PHYSIOLOGICAL BASIS OF ENERGY EXCHANGE AND THERMOREGULATION

1. Sources and ways of energy use in human organism.
2. Methods of human energy inputs determination. Respiratory coefficient.
3. Basal metabolism and conditions of its determination, factors that influence its value.
4. Working metabolism, meaning of its determination.
5. Human body temperature, its daily variations.
6. Physiological meaning of homoiothermy. Center of thermoregulation, thermoreceptors.
7. Organism thermogenesis, its regulation.
8. Organism heat emission, its regulation.
9. Regulation of body temperature constancy during changes of external environment temperature.
10. Physiological basics of tempering.

VIII. FUNCTIONAL SYSTEM OF DIGESTION

1. General characteristics of digestive system. Digestion in the mouth. Chewing, swallowing.
2. Saliva composition, its meaning in digestion.
3. Mechanisms of saliva formation, primary and secondary saliva.
4. Regulation of saliva formation. Influence of irritator's properties on quantity and quality of saliva.
5. Methods of human gastric secretory function research. Composition and properties of gastric juice. Mechanisms of hydrochloric acid secretion.
6. Cephalic phase of gastric juice secretion.
7. Gastric and intestinal phases of gastric juice secretion. Enteral stimulators and inhibitors of gastric secretion.
8. Nervous and humoral mechanisms of gastric secretion inhibition.
9. Motor function of stomach and its regulation. Mechanisms of gastric content passage to duodenum.
10. Methods of human pancreatic juice secretion research. Composition and properties of pancreatic juice.
11. Phases of pancreatic secretory function regulation.
12. Methods of human biliary excretion research. Composition and properties of bile.
13. Regulation of bile formation and excretion. Mechanisms of bile passage into the duodenum.

14. Composition and properties of intestinal juice. Regulation of its secretion. Cavitary and membrane digestion.
15. Absorption in digestive tract. Mechanisms of absorption of sodium ions, water, carbohydrates, proteins, lipids.
16. Motor function of intestines, types of contractions, their regulation.
17. Physiological mechanisms of hunger and satiety.

IX. FUNCTIONAL SYSTEM OF EXCRETION

1. General characteristic of excretory system. Role of kidneys in excretory processes. Peculiarities of renal blood supply.
2. Mechanisms of urine formation. Filtration in glomerulus and factors that it depends on.
3. Reabsorption and secretion in nephron, their physiological mechanisms.
4. Multiplying counter-current system of nephrons, its physiological mechanisms and role.
5. Regulation of sodium ions and water reabsorption in nephron tubules.
6. Role of kidneys in isotonicity ensuring. Mechanisms of thirst.
7. Role of kidneys in isovolume ensuring.
8. Role of kidneys in blood acid-base balance regulation.
9. Urine excretion and its regulation.

3.3. Control questions

Control questions, tasks for independent work are placed in workbooks (chapter "Methodical instructions for preparing higher education applicants for practical classes in the educational component "Physiology"), on the information stands of the department and on the page of the Department of Physiology on the Moodle platform of the Distance Learning system of KhNMU.Контрольні питання

3.4. Individual tasks:

1. Development of circuits of regulation of functional systems of an organism.
2. Development of circuits for the regulation of homeostasis with the participation of the kidneys.
3. Analysis of the literature and discussion on the topics:
   a) sleep, mechanisms of its development, species, biological role;
   b) cortical representation of functions of the hemispheres;
   c) language, physiological mechanisms of its development, cortical representation of its centers, their interaction.
4. Participation with reports at conferences, professional Olympiads, preparation of analytical reviews with presentations, etc.

Assessment of individual student tasks*:* At the meeting of the department, a list of individual tasks with the determination of the number of points for their completion, which can be added as incentives (no more than 10), was approved (Methodical meeting of the Department of Physiology dated August 26, 2022. Protocol No. 18). Points for individual assignments are awarded to higher education seekers once only by commission (committee - head of the department, head teacher, teacher of the group) and only under the conditions of their successful completion and defense. The total number of points for PND cannot exceed 120 points.

3.5. Rules for appealing the assessment: the appeal in case of receiving a negative assessment is carried out on the same day by submitting an application to the head of the Department of Physiology, who appoints a committee of examiners to retake the exam or final class.

4. POLICY OF THE EDUCATIONAL COMPONENT (a system of requirements and rules for the behavior of higher education seekers of higher education when studying the educational component, in particular, the teacher's reaction to untimely completed tasks, missed classes, behavior in the classroom, requirements for medical clothing, etc., separately indicate the availability and conditions of study for persons with special educational needs).

Policy and values educational component: "Physiology". Educational component requirements: Graduate higher education seekers are expected to attend all lectures and practical sessions. If a higher education seeker of higher education was absent from a lecture or a practical session, he must complete this session. The thematic plans of lectures, practical classes and the work schedule of the teachers of the Department of Physiology, who accept internships, are posted on the information stand of the department, in the ASU system and in the Distance Learning system of KhNMU on the Moodle platform. Written and

homework assignments must be completed in full and on time, if higher education seekers of higher education have questions, they can contact the teacher in person or by e-mail, which the teacher provides at the first practical session. During the lecture class, higher education seekers of higher education are recommended to keep a summary of the class and maintain a sufficient level of silence. Asking questions to the lecturer is absolutely normal.

Attending classes and behavior: timely completion of missed practical classes and lectures, inadmissibility of lateness and missing classes without a good reason. Compliance with requirements for clothing, medical examination, etc. The use of electronic gadgets during classes is possible only with the permission of the teacher. Behavior in the classroom (the basic yeses and noes): It is important for higher education applicants to follow the rules of appropriate behavior at the university. These rules are general for everyone, they also apply to all teaching staff and employees, and fundamentally do not differ from generally accepted norms. ***During classes, it is allowed to***: leave the audience for a short time if necessary and with the teacher's permission; drink soft drinks; take photos of presentation slides; take an active part in the lesson. During classes, it is forbidden to: eat (with the exception of persons whose special medical condition requires something else - in this case, medical confirmation is required); smoke, use alcoholic and even low-alcohol drinks or narcotic drugs; speak obscenely or use words that insult the honor and dignity of colleagues and teaching staff***;*** gaff; to cause damage to the material and technical base of the university (damage inventory, equipment; furniture, walls, floors, litter premises and territories); making noise, shouting or listening to loud music in the classrooms and even in the corridors during classes. ***Recommendations for the successful completion of the educational component:*** the activity of higher education seekers of higher education during practical classes, the completion of the necessary amount of educational work, namely active participation during the discussion of theoretical issues, situational tasks and practical skills during practical classes in the format of interactive learning methods. A higher education seeker of higher education should be ready to understand the theoretical material in detail, ask questions, express his point of view, and discuss. During the discussion, the following are important: respect for colleagues and tolerance for others and their experiences; receptivity and impartiality; the ability to disagree with an opinion, but respect the personality of the opponent, thorough reasoning of one's opinion and the courage to change one's position under the influence of evidence; mandatory acquaintance with primary sources. ***A creative approach*** in its various manifestations is welcome. Applicants of higher education are expected to be interested in participating in city, all-Ukrainian and international conferences, competitions and other events from the educational component "Physiology" and from the SRW Department of Physiology. ***Encouragement and punishment:*** monothematic higher education seeker conferences are held at the Department of Physiology, participation in the department's SSS, scientific conferences, for active participation in which the higher education seeker receives additional points***.***

Safety techniques: in the first lesson of the educational component "Physiology", the basic principles of occupational safety are explained by means of appropriate instruction. Every higher education higher education seeker is expected to know where the nearest exit to the classroom is, where the fire extinguisher is, how to use it, etc. In accordance with the Order of the Rector of KhNMU "On the Action Algorithm in case of detection of signs of an acute respiratory disease in a higher education seeker, teacher or employee of KhNMU", it is mandatory to observe sanitary and hygienic norms and appropriate behavior in conditions of an epidemic or pandemic.

5. ACADEMIC INTEGRITY.

The Department of Physiology maintains a zero tolerance for plagiarism in accordance with the Order of the Rector of KhNMU "On the procedure for checking in KhNMU text documents of dissertation theses, scientific publications, materials of scientific forums, educational literature, educational and methodical publications and teaching aids for the presence of textual borrowings." Graduates are expected to want to constantly improve their academic writing skills.

In the first classes, information activities will be held on what exactly is considered plagiarism and how to correctly conduct a research and scientific search. ***Academic Integrity Policy:*** Both lectures and practical’s are important during learning: respect for colleagues; tolerance for others and their experiences; receptivity and impartiality; the ability to disagree with an opinion, but respect the personality of the opponent; thorough reasoning of one's opinion and the courage to change one's position under the influence of evidence; Self-expression, when a person avoids unnecessary generalizations,

describes his feelings and formulates his wishes based on his own thoughts and emotions; mandatory acquaintance with primary sources. The procedure for informing about changes in the syllabus: announcements about changes in the syllabus must be published on the page of the Department of Physiology on the Moodle platform of the KHNMU Distance Learning system and on the information stands of the department.

6. RECOMMENDED REFERENCE MATERIALS

Basic references:

1. Medical physiology (eleventh edition) / Arthur C. Guyton, John E. Hall. – Elseveier, 2006.
2. Saladin: Anatomy & Physiology: The Unity of Form and Function (Third Edition) / Saladin K.S. – The McGraw−Hill Companies, 2003.
3. Medical physiology: principles for clinical medicine / edited by Rodney A. Rhoades, David R. Bell. – 4th ed. – Lippincott Williams & Wilkins, a Wolters Kluwer business, 2013.
4. Linda.S.Costanzo Physiology(fifth edition)/Linda.S.Costanzo.–Elsevier, 2014
5. Kim E. Barret Medical Physiology: Examination & Board Review / Kim E. Barret, Susan M. Barman, Scott Boitano, Jane F. Reckelhoff. – © McGraw- Hill Education, 2018.
6. Walter F. Boron; Emile L. Boulpaep Medical Physiology E-Book (3rd ed.) ISBN: 9781455733286, Elsevier Health Sciences, March 2016.
7. Moroz V.M., Shandra O.A., Vastyanov R.S., Yoltukhivsky M.V., Omelchenko O.D. Phisiology: Textbook / Edited by V.M.Moroz, O.A.Shandra. – 5th edition. – Vinnytsia: Nova Knyha Publishers, 2020. – 728 p.

Additional references:

1. Guyton A. C., Hall J. E., Textbook of Medical Physiology. - 13th ed. Elsevier. 2016. – 1038 p. First Aid for the USMLE Step 1. 2018: A student to student Guide. McGraw-Hill – 890 p.
2. Despopoulos A. Color Atlas of Physiology/7th edition / A. Despopoulos, S. Silbernagl. - Stuttgart: Georg Thieme Verlag, 2015. - 472 p.
3. Fox, S.I., Human Physiology, 14th edition, 2015.
4. Sebastian S, Puranik N. Recent concepts about sense of smell, odorant receptors and physiology of olfactionan insight. Physiology and Pharmacology. 2016 May 10;20(2):74-82. 29.
5. Tahara Y, Shibata S. Circadian rhythms of liver physiology and disease: experimental and clinical evidence. Nature Reviews Gastroenterology and Hepatology. 2016 Feb.

6. INFORMATION RESOURCES

1. Department of Physiology, course: Physiology / specialty 223 "Nursing" / 1st bachelor's level / 1 course. https://distance.knmu.edu.ua/course/view.php?id=5251
2. https://www.testcentr.org.ua/uk/krok-1
3. The Department of Physiology has available lecture texts (10 lectures - 20 hours) in printed form and on electronic carriers.
4. Presentation of all lectures - on electronic media and in printed form.
5. http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/polog_komis_ad_text.pdf
6. http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/polog_neform_osv.pdf
7. INCLUSIVE EDUCATION: http://www.knmu.kharkov.ua/index.php?option=com_content&view=article&id=7108%3A2021-03-10-14-08-02&catid=12%3A2011-05-10-07-16-32&Itemid=33&lang=uk
8. ACADEMIC HONESTY: http://www.knmu.kharkov.ua/index.php?option=com_content&view=article&id=2520%3A2015-04-30-08-10-46&catid=20%3A2011-05-17-09-30-17&Itemid=40&lang=uk
9. http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/kodex_AD.docx

8. METHODICAL SUPPORT

1. The syllabus of educational component "Physiology" of the first (bachelor) level of higher education in the field of knowledge 22 Health care specialty 223 “Nursing”.

2. Program of educational component "Physiology" of the first (bachelor) level of higher education in the field of knowledge 22 Health care specialty 223 “Nursing”.
3. Plans for lectures, practical classes and independent work of higher education seekers.
4. Theses of lectures on educational component and their presentations.
5. Methodological recommendations for teachers.
6. Methodological materials providing independent work of higher education seekers.
7. Test tasks and control questions for practical classes.
8. Questions and tasks for control of the mastering of the section.
9. List of questions for exam, tasks for checking practical skills during the exam.