

EUROPEAN MEDICAL UNIVERSITY

SYLLABUS OF THE EDUCATIONAL DISCIPLINE "PHYSIOLOGY"

Cycle of Higher Education:	second cycle of higher education (Master's degree)
Field of Study:	22 «Healthcare»
Specialty:	222 «Medicine»
Educational qualification:	Master of Medicine
Professional qualification:	doctor

1. Name, Code of the discipline and number of credits

Syllabus of the discipline "Physiology"

Cycle of Higher Education: second cycle of higher education (Master's degree)

Field of Study: 22 «Healthcare»

Specialty: 222 «Medicine» (2 course)

Educational qualification: Master of Medicine

Professional qualification: doctor

Semester: 3,4.

Number of credits ECTS (number of hours): 9 credits ECTS (270 hours).

Distribution by types of trainings and hours of study – Lectures 18 hours, Practical lessons – 111 hours, Independent work – 141 hours.

2. Time and place of educational discipline

Semester: 3, 4.

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3, Akademika H. Dzyaka St., Dnipro.

3. Prerequisites and Postrequisites of educational discipline

Prerequisites: physiology, microbiology, virology, immunology, biological and bioinorganic chemistry, human anatomy, clinical biochemistry, clinical physiology, pharmacology, medical biology, hygiene and ecology.

Post-qualifications: surgery, obstetrics and gynecology, otorhinolaryngology, ophthalmology, neurology, urology, dermatology, venereology, internal medicine, oncology, infectious diseases.

4. Characteristic of the educational discipline

4.1. Purpose and definition of the educational discipline:

The purpose of teaching the discipline "Physiology" is to develop in-depth theoretical knowledge and practical skills to understand the basic concepts of general nosology, the role of destructive (destructive) and protective-compensatory phenomena in the development of the disease, analysis of typical pathological processes and their general patterns of development, interpretation of the basic principles of etiological and pathogenetic prevention and recovery from the disease.

"Physiology" is a normative discipline that forms an understanding of the general patterns and mechanisms of occurrence, development and completion of various disorders of the body; analysis of the etiology and pathogenesis of functional disorders of organs and body systems in various nosologies, typical pathological conditions.

4.2. Objectives of the discipline:

- 1) to study the basic concepts of general nosology: health, disease, pathological process, typical pathological process, pathological reaction, pathological condition, etiology, pathogenesis;
- 2) to explain the basic concepts of etiology: causal factors, risk factors, conditions of occurrence and development of the disease; 3) to analyze various options for the development of cause and effect relationships in pathogenesis;
- 4) evaluate the importance of modern research methods (experimental and clinical) for Physiology; 5) analyze the role of environmental factors in the occurrence of diseases;
- 6) explain the mechanisms of pathogenic action of physical, chemical and biological environmental factors;
- 7) to substantiate the cause and effect relationships, while separating local and general changes, pathological and adaptive-compensatory in the pathogenesis of manifestations of environmental factors (overheating, cooling, burns, frostbite, radiation sickness, decompression and compression diseases);
- 8) to define the concept and analyze typical disorders of immunological reactivity: immunodeficiency states, allergies, autoimmune reactions (diseases);
- 9) apply various principles to classify disorders of the immune system; 10) characterize the causative factors, risk factors and conditions of occurrence, mechanisms of development of typical disorders of the immune system;
- 11) analyze the causes, mechanisms of development and manifestations of infectious diseases;
- 12) analyze the mechanisms of cell damage in the pathogenesis of allergic and autoimmune reactions;
- 13) be able to analyze the cause and effect relationships in the pathogenesis of major disorders of the immune system.

4.3. Appointment of the discipline

Competencies

General competencies (GC):

GC 1	Ability to think abstractly, analyses and synthesize.
GC 2	Ability to learn and master modern knowledge.
GC 3	Ability to apply knowledge in practical situations.
GC 4	Knowledge and understanding of the subject area and understanding of professional activities.
GC 6	Ability to make justified decisions.
GC 10	Ability to use information and communication technologies.
GC 11	Ability to search, process and analyses information from various sources.
GC 12	Certainty and perseverance in relation to the tasks set and responsibilities assumed.

Special (professional, subject) competencies (SC):

SC 2	Ability to determine the necessary list of laboratory and instrumental studies and evaluate their results.
SC 23	Ability to develop and implement scientific and applied projects in the healthcare sector.
SC 24	Compliance with ethical principles when working with patients and laboratory animals.
SC 25	Compliance with professional and academic integrity, being responsible for reliability of the obtained scientific results.

Program learning outcomes (PLO):

PLO 1	Have a thorough knowledge of the structure of professional activity. Be able to carry out professional activities that require updating and integrating knowledge. Be responsible for professional development, the ability to further professional training with a high level of autonomy.
PLO 2	Understanding and knowledge of fundamental and clinical biomedical sciences at a level sufficient to solve professional problems in the field of healthcare.
PLO 3	Specialized conceptual knowledge that includes scientific achievements in the field of healthcare and is the basis for conducting research, critical understanding of problems in the field of Medicine and related interdisciplinary problems.
PLO 7	Prescribing and analyzing additional (mandatory and optional) examination methods (laboratory, functional and/or instrumental) (according to list 4), patients with diseases of organs and body systems for differential diagnosis of diseases (according to list 2).
PLO 21	Searching for the necessary information in professional literature and databases of other sources, analyzing, evaluating and applying this information.

4.4 Content of the discipline

Lectures

№ з/п	Topics	hours
1	Physiology as a science. The subject and tasks of physiology. Physiology of excitable tissues. Physiology of neuron and nerve fibers. Physiology of muscles.	2
2	Excitation and inhibition in the central nervous system (CNS). Coordination activity of the central nervous system. The role of the central nervous system and the autonomic nervous system in the regulation of motor functions.	
3	The role of the central nervous system in the regulation of motor functions. The role of the midbrain and cerebellum in the regulation of motor functions. The role of the thalamus, basal ganglia and cortex of the large hemispheres in the regulation of motor functions.	2
4	Vegetative nervous system (VNS) of a person. Conditioned reflexes. Memory. Types of human VNS. Sleep.	2
5	The role of the autonomic nervous system in the regulation of motor functions.	
6	Humoral regulation of visceral functions. General properties of hormones.	2
7	Physiological properties of the heart. Pumping function of the heart. Regulation of heart activity and systemic hemodynamics.	2

8	Blood system. Study of physical and chemical properties of blood. Study of the number of erythrocytes and hemoglobin in the blood.	2
9	Methods of studying heart activity. Regulation of systemic hemodynamics and blood pressure.	2
Total		18

5. Topics of seminar classes (not provided)

6. The topics of practical classes

Practical lessons		
№ 3/II	Topics	hours
3 semester		
1	Physiology as a science. The subject and tasks of physiology. Methods of physiological research. Electrical phenomena in excitable tissues.	3
2	Physiology of neuron and nerve fibers. Conduction of excitation through nerve fibers and through the neuromuscular synapse.	3
3	Physiology of muscles. Properties and mechanisms of skeletal contraction and relaxation	3
4	Content section 1. Test control and practical skills in "Physiology of excitable tissues".	3
5	The reflex principle of the central nervous system. Excitation and inhibition in the central nervous system. Coordination activity of the central nervous system.	3
6	Study of the role of the spinal cord in the regulation of motor functions.	3
7	The role of the brainstem and cerebellum in the regulation of motor functions. The role of the vestibular sensory system.	3
8	The role of the thalamus, basal ganglia, cortex of the large hemispheres in motor regulation funktion	3
9	Content section 2. Test control and practical skills in Physiology of the CNS	3
10	Vegetative nervous system, conditioned reflexes. Emotions, motivations, memory.	3
11	Inhibition of conditioned reflexes. Features of the higher nervous activity of a person, sleep.	3
12	General characteristics of sensor systems. Somatosensory system. Physiology of pain sensitivity.	3
13	Physiology of visual and auditory sensory systems	3
14	Content section 3. Test control and practical skills on the topic: "Physiology of sensory systems and human VNS"	3
15	Study of mechanisms of nervous regulation of visceral functions.	3
16	Study of mechanisms of humoral regulation of visceral body functions. Study of the role of hormones in the regulation of homeostasis.	3
17	Content section 4. Test control and practical skills on the topic: The role of the ANS and the endocrine system in the regulation of the body's visceral functions"	3

18	Exchange of substances and energy.	3
Total of 3 semester		54
4 semester		
19	Blood system. Study of physical and chemical properties of blood. Study of the number of erythrocytes and hemoglobin in the blood.	3
20	Protective functions of blood.	3
21	Blood groups. Types and physiological mechanisms of hemostasis. platelet physiology	3
22	Content section 5. Test control and practical skills on the topic: "Physiology of the blood system".	3
23	Physiological properties of the heart. Pumping function of the heart. Regulation of heart activity. Study of the dynamics of cardiac excitation.	3
24	The role of blood vessels in blood circulation. Study of regulation of blood circulation. Regulation of systemic hemodynamics and blood pressure	3
25	Methods of studying heart activity. ECG registration and analysis. Study of blood pressure in humans.	3
26	Content section 6. Test control and practical skills on the topic: "Physiology of the cardiovascular system".	3
27	Respiratory system. Study of external breathing. Study of diffusion, transport of gases by blood.	3
28	Study of breathing regulation.	3
29	Content section 7. Test control and practical skills on the topic: "Physiology of breathing"	3
30	Digestive system. Study of digestion in the oral cavity. The role of taste and smell sensory systems.	3
31	Study of digestion in the stomach.	3
32	Studies of digestion in the intestines. Formation of feelings of hunger and satiety.	3
33	Content section 8. Test control and practical skills in "Physiology of the Gastrointestinal tract"	3
34	Study of the mechanisms of urine formation.	3
35	Study of the mechanisms of urine formation.	3
36	Content section 9. Test control and practical skills from "Physiology of the excretory system"	3
37	Final control "Physiology".	3
Total of 4 semester		57
Total		111

7. Topics of laboratory classes (not).

8. Independent work.

Independent work.

№ з/п	Topics	hours
3 semester		
1	The history of the development of physiology in the 19th century. Ukrainian Physiological School.	5
2	Physiology of neuron and nerve fibers. Conduction of excitation through nerve fibers and through the neuromuscular synapse.	5
3	Physiology of muscles. Properties and mechanisms of contraction and relaxation of skeletal muscles.	5
4	The reflex principle of the central nervous system. Excitation and inhibition in the central nervous system. Coordination activity of the central nervous system.	5
5	Study of the role of the spinal cord in the regulation of motor functions.	5
6	The role of the brainstem and cerebellum in the regulation of motor functions. The role of the vestibular sensory system.	5
7	The role of the thalamus, basal ganglia, cortex of the large hemispheres in the regulation of motor functions.	5
8	VNS, conditioned reflexes. Emotions, motivations, memory.	5
9	Inhibition of conditioned reflexes. Features of the higher nervous activity of a person, sleep.	5
10	General characteristics of sensor systems. Somatosensory system. Physiology of pain sensitivity.	5
11	Physiology of visual and auditory sensory systems.	5
12	Vestibular sensory system.	5
13	Study of mechanisms of nervous regulation of visceral functions.	6
14	Study of mechanisms of humoral regulation of visceral body functions. Study of the role of hormones in the regulation of homeostasis.	6
15	Exchange of substances and energy.	6
Total of 3 semester		78
4 semester		
16	Blood system. Study of physical and chemical properties of blood. Study of the number of erythrocytes and hemoglobin in the blood.	4
17	Protective functions of blood.	4
18	Blood groups. Types and physiological mechanisms of hemostasis. platelet physiology.	5
19	Physiological properties of the heart. Pumping function of the heart. Regulation of heart activity. Study of the dynamics of cardiac excitation.	5

20	The role of blood vessels in blood circulation. Study of regulation of blood circulation. Regulation of systemic hemodynamics and blood pressure	5
21	Methods of studying heart activity. ECG registration and analysis. Study of blood pressure in humans.	5
22	Respiratory system. Study of external breathing. Study of diffusion, transport of gases by blood.	5
23	Study of breathing regulation.	5
24	Digestive system. Study of digestion in the oral cavity. The role of taste and smell sensory systems.	5
25	Study of digestion in the stomach.	5
26	Studies of digestion in the intestines. Formation of feelings of hunger and satiety.	5
27	General characteristics of excretory systems. The role of the kidneys in the excretion process. Study of the mechanisms of urine formation.	5
28	Preparation for the final control.	5
Total of 4 semester		63
Total		141

Topics of the lecture course: reveal problematic issues in the relevant sections “Physiology”.

Practical classes provide theoretical justification of the main issues of the topic and acquiring **the following practical skills:**

List of practical skills:

1. Conduct pathophysiological analysis of clinical, laboratory, experimental and other data and formulate on their basis a conclusion about the possible causes and mechanisms of development of pathological processes (diseases).
2. To plan and conduct (in compliance with the relevant rules) experiments on animals, to process and analyze the results of experiments, to correctly understand the significance of the experiment for the study of clinical forms of pathology (model of inflammation in the maxillofacial area, hypoxia, fever, etc.)
3. Using Starr's formula, calculate the stroke and minute volumes of the heart by the value of blood pressure (SBP, DBP, DBP) and heart rate. Assess the state of myocardial contractility by the value of these two indicators.
4. According to the finished electrocardiogram to be able to:
 - determine the type of cardiac arrhythmia: a) arrhythmias due to impaired automaticity (sinus tachycardia, sinus bradycardia); b) arrhythmias due to impaired excitability (extrasystole, paroxysmal tachycardia, ventricular fibrillation); c)

arrhythmias due to conduction disorders (complete and incomplete atrioventricular heart block);

- what changes in the ECG indicate these types of cardiac arrhythmias;
- name possible mechanisms of these types of cardiac arrhythmias.

5. To know:

- the method of determining the number of red blood cells per unit volume of blood;
- method of determining hemoglobin in a unit volume of blood;
- methods for determining the total number of leukocytes per unit volume of blood.

6. Based on the finished hemogram, make:

a) make a conclusion about the presence of anemia:

- be able to calculate and then assess anemia by the value of the color index;
- assess anemia by the type of hematopoiesis;
- assess anemia by bone marrow function;

b) conclusion on the presence of leukocytosis, leukopenia:

- assess the leukocyte formula by the percentage of certain types of leukocytes;
- evaluate the leukocyte formula for the presence or absence of a "nuclear" shift of neutrophils, its nature (taking into account the total number of leukocytes);
- name two or three diseases in dental practice that may have a similar blood test;

c) a conclusion about the presence of leukemia:

- its type by morphological characteristics;
- its type by clinical course;
- its type by the number of leukocytes per unit volume of blood.

7. According to the biochemical analysis of blood, urine and feces, be able to distinguish the main types of jaundice (mechanical, hemolytic, parenchymal).

8. According to ready-made urine and blood tests and some functional parameters of body systems, determine the presence of typical renal dysfunction (nephritic, nephrotic syndromes), glomerular filtration and tubular reabsorption disorders.

9. Based on the prepared temperature curves, be able to:

- determine the type of temperature curve (indicate the Russian and Latin names);
- characterize daily temperature fluctuations;
- name the diseases in which this type of temperature curve occurs.

10. To be able to determine the type of hypoxia by the indicators of oxygen transport function of blood.

11. Be able to determine the type of periodic respiration shown on the spirogram. Explain the causes and mechanism of development.

12. To be able to determine the typical disorders of gastric secretory function according to the analysis of gastric juice:

- hypersecretion with hyperchlorhydria;
- hyposecretion with hypochlorhydria;
- hyposecretion with achlorhydria.

13. Name the basic principles of therapy of acute inflammatory process in the maxillofacial region.

Independent work of a student provides for preparation for practical classes and final control, studying topics for independent out-of-class work, preparing abstract reports, presentations, tables. Control of learning results of topics of independent out-of-class work is carried out during the class and during final control in the discipline.

Individual work includes the study of scientific literature, preparation of reviews on the submitted topics for presentation, implementation of scientific and practical research, participation in specialized competitions, scientific and practical conferences, competitions of student scientific papers.

Calendar plans of practical classes, thematic plan of independent extracurricular work, scope and directions of individual work are published on the website of the Department.

Route for receiving materials: Website of EMU /Student/ Department of Fundamental Disciplines with the course of traditional and alternative medicine/ Educational and methodological support of the Department/ Pediatrics / or follow the link Department of Fundamental Disciplines with a course in traditional and alternative medicine discipline "Physiology". Materials are accessed from the student's Office 365-based corporate account.

5. Forms and methods of monitoring learning success

Current control in practical classes	Methods: individual oral survey, structured written works, test tasks with the choice of correct answers.
Control of mastering the thematic section of the discipline in intermediate control classes	Methods: oral or written survey, electronic testing, <i>methods of self-control and self-assessment</i> .
Final semester control	According to the regulation on control measures in EMU (regulation of EMU)
Final control of the discipline - <i>exam</i>	Methods: by exam cards in the form of an oral exam, monitoring of acquiring of practical skills (According to the Regulation on control measures in EMU (Regulation of EMU)).
Tools for diagnosing learning success	Theoretical questions, tests, clinically oriented situational tasks, practical tasks, demonstration of practical skills.

6. Evaluation criteria

Knowledge assessment is carried out according to regulation on control measures in EMU ([regulation of EMU](#)).

Current control	According to the four-point system of traditional grades: 5 "Excellent", 4 "Good", 3 "Satisfactory", 2 "Unsatisfactory"
Control of practical skills	According to the four-point system of traditional grades
Exam	Based on a 200-point scale (the sum of points for the current academic activity of the student, the result of passing the exam and for successful completion of an individual task, if any) Credited: 120 to 200 points Not credited: less than 120 points (see Rating scale)
Final control for the discipline	The final control of students' academic performance is carried out after completing the study of the discipline and is implemented in the form of an exam.
Discipline assessment:	The score on the discipline is determined based on the results of assessment of current activities and is expressed using a fourpoint scale : ("Excellent", "Good", "Satisfactory", "Unsatisfactory"), multi-point scale and ECTS. The assessment in the discipline consists of an assessment of the current academic performance and the result of passing the exam (in points), which is set when evaluating theoretical knowledge and practical skills in accordance with the list defined by the discipline program. The number of points that the applicant scored for current academic.

	performance in the discipline is defined as the arithmetic mean of the number of points that the applicant received during the study of the discipline (practical, seminar, laboratory classes, etc.). The resulting value of the average traditional rating is converted to points according to the scale of conversion of traditional ratings to rating points. The maximum number of points is 200.
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Matching grades on a 200-point scale, a 4-point (traditional) scale, and ECTS scale

On a 200-point scale	Rating on a 4-point scale
180–200	Excellent
140–179	Good
120–139	Satisfactory
0–119	Unsatisfactory

On a 200-point scale	ECTS evaluation
192–200	A
172–191	B
148–171	C
128–147	D
120–127	E
0–119	F

Discipline/course policy

The student has the right to receive high-quality educational services, access to up-to-date scientific and educational information, qualified advice during the study of the discipline and mastering practical skills. The policy of the department in the provision of Educational Services is student-centered, based on the regulatory documents of the Ministry of Education and the Ministry of Health of Ukraine, the Charter of the EMU and the procedure for providing educational services regulated by the regulation on the organization of the educational process in the EMU and the principles of academic integrity.

Compliance with the EMU schedule, safety precautions in the classroom.

Requirements for preparing for practical classes.

Students should arrive at classes on time, without being late. A student who is more than 10 minutes late for classes is not allowed in and must work it out in accordance with the established procedure. During practical classes, the student must wear a work uniform (medical gown, cap). Students who do not have a work uniform are not allowed to attend classes. The student must follow the safety rules during practical classes and while staying in the Department's premises. When discussing theoretical issues, students should demonstrate tolerance, politeness and respect for their colleagues and the teacher; when performing practical tasks, the workplace should be kept in order and cleaned after completing practical work.

Use of mobile phones and other electronic devices. The use of mobile phones and other electronic devices in the classroom is not allowed, only during Distance Learning, provided that it is technically necessary.

Academic integrity. When studying the discipline, the student should be guided by the following regulations: on academic integrity of EMU (regulation of EMU). In case of violation of the regulations of academic integrity during the current and final controls, the student receives a grade of "2" and must work it out to the teacher in accordance with the established procedure.

Regulation on control measures in EMU (Regulation of EMU).

Skippping classes. Missed classes should be worked out in accordance with the procedure established in the regulations on control measures in the EMU (regulation of EMU) during the time determined by the work schedule (Department of Fundamental Disciplines with a course in traditional and alternative medicine) to the teacher on duty. To work out a missed lesson the student must pass a test and answer in writing or verbally the question on the topic of the lesson.

Procedure for admission to the final control in the discipline is given in the regulations on control measures and regulations on the organization of the educational process in the EMU (regulation of EMU) and regulations on control measures in the TNM DMI (regulation of EMU). Students who do not have missed not worked out practical classes and lectures and have received an average traditional grade of at least "3" are allowed to participate in the final control.

Additional individual points. Points are awarded subject to the mandatory participation of the head, head teacher and teacher. These points are encouraging and are added once to the total score of the current academic performance and the result of passing the comprehensive exam. Their total number for one student should not exceed 10, and the final amount of points for an academic discipline should not exceed 200 points.

Individual tasks include:

- 1) writing essays and creating multimedia presentations with reports at meetings of the student scientific group of the department – 3 points;
- 2) participation in the creation of tables, graphological structure, posters on the topics of practical classes – 2 points;
- 3) participation in the student competition in the discipline at the First Stage – 1 point;
- 4) participation/prize-winner of the All-Ukrainian student competition in the discipline - 7/10 points;
- 5) author or co-author of abstracts/article – 2/5 points;
- 6) author or co-author of an oral/information stand report at a scientific conference – 6/3 points;
- 7) author of a student scientific paper accepted for participation or awarded by a diploma of I-III degree in the All – Ukrainian competition of student scientific papers at Stage II - 8 (participation) or 10 (diploma) points.

Resolving conflict issues. If there are misunderstandings and complaints against the teacher due to quality of educational services provided, knowledge assessment, and other conflict situations, the student must first report his/her claims to the teacher. If the conflict issue is not resolved, the student has the right to submit an appeal to the head of the department in accordance with the regulations on consideration of applications from applicants for higher education in EMU (regulation of EMU), Regulations on consideration of applications, complaints, and proposals of students in EMU (regulation of EMU), Regulations on meeting the requirements of the organization of the educational process (regulation of EMU), Regulation on the appeal of the results of the final control of knowledge of applicants for higher education in EMU (regulation of EMU), Regulations on safe educational environment in EMU (regulation of EMU).

Policy in the context of distance learning. The procedure for distance learning is regulated by regulation of EMU. The main training platforms for conducting training sessions are Microsoft Teams, Zoom. The procedure for conducting practical classes and lectures, working out and consultations during Distance Learning is published on the Department's Web page Department of Fundamental Disciplines with a course in traditional and alternative medicine. Feedback from the teacher is provided directly during the lesson and/or consultation, and is also possible via email (in case of force majeure) during working hours.

1. Training resources

Educational and methodological support of the discipline is published on the website of the Department (Department of Fundamental Disciplines with a course in traditional and alternative medicine). Consultations are held according to the consultation schedule.

2. Schedule and distribution of groups by teacher are published on the

Department's Web page (Department of Fundamental Disciplines with a course in traditional and alternative medicine).

3. **Questions for intermediate and final control of the discipline** are published on the Department's Web page (Department of Fundamental Disciplines with a course in traditional and alternative medicine).

7. Recommended literature

1. Guyton and Hall. Textbook of Medical Physiology : підруч.: пер. з англ. 14-го вид. : у 2 т. Т. 1. - 2022. - 634 p.
2. Guyton and Hall. Textbook of Medical Physiology : підруч.: пер. з англ. 14-го вид. : у 2 т. Т. 2. - 2022. - 584 p.
3. Physiology : Textbook /Ed. By V.M. Moroz, O.A. Shandra. - Vinnitsa : Nova Knyha Publishers, 2011. - 888 pp.

Information resources:

[http: // reftrend.ru/604585.htm](http://reftrend.ru/604585.htm)

<http://www.meddean.luc.edu>

<http://www.nphysiology.dp.ua>