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INTERNATIONAL EUROPEAN UNIVERSITY

# SYLLABUS

## INTERNATIONAL EUROPEAN UNIVERSITY


## SCHOOL OF MEDICINE

**PHYSIOLOGY**

**2023**

# SYLLABUS

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|---|---|
| Course Name | PHYSIOLOGY |
| Lecturer (s) | Professor Ivan Savytskyi<br>Senior lecturer Svitlana Ukrainska |
| Lecturer's profile | https://medicine.ieu.edu.ua/pro-yemsh/kafedry/ kafedra-fundamentalnykh-dystsyplin |
| Consultations | |
| online consulting | Second Tuesday of the month, 5 p.m. – 6 p.m. |
| offline consulting | First Wednesday of the month, 4 p.m. – 5 p.m. |
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| Form of final control | test | def. test | exam |
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# SYLLABUS

## 1 Brief discipline annotation

Subject matter of the academic discipline: functions of a living organism, their relationship to each other, regulation and adaptation to the external environment, origin and formation in the process of evolution and individual development of an individual.

## 2 Background for studying discipline

According to the schedule of the training process, the Physiology discipline is taught for second-year students in the first and second semester. The academic discipline is based on the knowledge of medical biology, Latin, ethics, philosophy, ecology, medical and biological physics, medical chemistry, biological and bioorganic chemistry, morphological disciplines, as well as is integrated with these disciplines.

## 3 Goal and objectives of the discipline

Physiology as a basic discipline is aimed at training highly qualified Masters of Medicine and is one of the most important subjects in the medical education system. The goal of the Physiology academic discipline is to study functions of different cells, tissues, organs and systems as a whole in order to use the acquired knowledge while learning subsequent medical disciplines and in future professional activities. It provides the understanding of the concept of health, healthy lifestyle and dysfunction in the process of life activities.

## 4 Learning outcomes

The use of the acquired knowledge in professional activities. As a result of training, students should analyze the age particularities of body functions and their regulation, regulated parameters and draw conclusions about mechanisms of nervous and humoral regulation of physiological functions of the body and its systems, analyze the state of human health under different conditions based on physiological criteria, interpret the mechanisms and regularities of functioning of excitatory structures of the body, analyze the state of sensory processes in human life activities, explain physiological foundations of methods of studying body functions; explain the mechanisms of integrative activity of the body.

Physiology lays the foundation for studying pathophysiology and propaedeutics of clinical disciplines, which implies the integration of teaching with these disciplines and the formation of skills to apply knowledge of physiology in the process of further education and in professional activities; lays the foundations for a healthy lifestyle and prevention of disorders of functions in the process of life activities.

## 5 ECTS credits

The discipline consists of 9 ECTS credits: 270 hours (40 hours of lectures, 105 hours of practical classes, 125 hours of independent work).

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## 6 Course Content

| Sections and topics | Amount of hours | | | | | |
|---|---|---|---|---|---|---|
| | total | including | | | | |
| | | l | p | l | ind | i.w. |
| **Section 1. Introduction to physiology. Physiology of excitatory structures** | | | | | | |
| Topic 1. Subject matter and objectives of physiology. Methods of physiological research. | 7 | 2 | 3 | | | 4 |
| Topic 2. Resting potential of nerve and muscle fibers. | 7 | 2 | 3 | | | 4 |
| Topic 3. Activity potential of nerve and muscle fibers. | 9 | 2 | 3 | | | 4 |
| Topic 4. Mechanisms of electrical irritation of excitatory structures. | 9 | 1 | 3 | | | 5 |
| Topic 5. Contraction of skeletal and smooth muscles. | 9 | 1 | 3 | | | 5 |
| **Section 3. Nervous regulation of body functions** | | | | | | |
| Topic 6. Excitation and inhibition in CNS. | 9 | 2 | 3 | | | 4 |
| Topic 7. The role of the spinal cord in the regulation of functions. | 9 | 1 | 6 | | | 4 |
| Topic 8. The role of the brain in the regulation of functions. | 9 | 1 | 6 | | | 4 |
| Topic 9. Nervous regulation of autonomic functions. | 9 | 2 | 3 | | | 5 |
| **Section 3. Humoral regulation of body functions** | | | | | | |
| Topic 10. Humoral regulation of vegetative functions. | 9 | 2 | 3 | | | 4 |
| Topic 11. The role of hormones in the regulation of physical, mental and sexual development. | 9 | 1 | 3 | | | 4 |
| Topic 12. The role of hormones in the regulation of homeostasis and adaptation to stress factors. | 12 | 1 | 6 | | | 5 |
| **Section 4. Physiology of analyzers and higher nervous activity** | | | | | | |
| Topic 13. Sensory systems. | 9 | 1 | 3 | | | 5 |
| Topic 14. Physiological foundations of behavior. | 9 | 1 | 3 | | | 4 |
| **Section 5. Physiology of the blood system** | | | | | | |
| Topic 15. Physical and chemical properties of blood. | 9 | 1 | 3 | | | 5 |
| Topic 16. Properties and functions of red blood cells. | 9 | 1 | 3 | | | 4 |
| Topic 17. Protective characteristics of blood. Blood group. | 9 | 1 | 3 | | | 4 |
| Topic 18. Hemostasis. | 9 | 1 | 3 | | | 4 |
| **Section 6. Physiology of the cardiovascular system** | | | | | | |
| Topic 19. General characteristics of blood circulation. | 11 | 2 | 3 | | | 5 |
| Topic 20. Mechanical work of the heart. | 9 | 1 | 3 | | | 4 |
| Topic 21. Registration and analysis of ECG. | 9 | 1 | 3 | | | 4 |
| Topic 22. Movement of blood in arterial and venous vessels. | 9 | 2 | 3 | | | 5 |
| Topic 23. Regulation of the heart, local and systemic | 9 | 2 | 6 | | | 4 |
| **Section 7. Physiology of the respiratory system** | | | | | | |
| Topic 24. Examination of external respiration. | 9 | 1 | 3 | | | 4 |
| Topic 25. Gas exchange in the lungs. Transport of gases by blood. | 9 | 1 | 3 | | | 4 |
| **Section 8. Physiology of the digestive system** | | | | | | |
| Topic 26. Digestion in the oral cavity and stomach. | 9 | 1 | 3 | | | 4 |
| Topic 27. Digestion in the intestines. The role of the liver and pancreas. Absorption in the gastrointestinal tract. | 9 | 1 | 3 | | | 5 |
| **Section 9. Physiology of metabolism and energy. Thermoregulation** | | | | | | |
| Topic 28. Physiology of metabolism and energy. Thermoregulation. | 14 | 2 | 6 | | | 4 |
| **Section 10. Physiology of the excretory system** | | | | | | |
| Topic 29. Regulation of kidney function. | 12 | 2 | 6 | | | 4 |
| ***Total hours*** | **270** | **40** | **105** | | | **125** |

## 7 List of obligayory tasks

1. Action potential, mechanisms of origin, its parameters, physiological role
2. Laws of excitation conduction by nerve fibers
3. Coupling of excitation and contraction. Mechanisms of contraction and relaxation of skeletal muscles.
4. Types of muscle contractions: single and tetanic; isotonic and isometric.
5. Mechanisms of excitation transmission through neuromuscular synapse.
6. The concept of reflex. The structure of the reflex arc and the functions of its links.
7. Motor reflexes of the hindbrain, decerebration rigidity
8. Excitation and inhibition in the nervous system
9. Sensory, associative and motor areas of the cerebral cortex, their functions
10. Synapses of autonomic nervous system, their mediators, cytoreceptors and blockers of excitation transmission in synapses.
11. Somatosensory system, its structure and functions.
12. Physiological mechanisms of pain
13. Biological forms of behavior. Needs and motivations, their role in the formation of behavior
14. Functions of the new cerebral cortex and human nervous activity.
15. Language, its functions, physiological foundations of formation
16. Composition and functions of blood
17. Electrolytes of plasma. Osmotic pressure of blood and its regulation
18. Types of hemoglobin and its compounds, their physiological role
19. Physiological feature of the rhesus blood system (CDE).
20. Coupling of excitation and contraction in myocardium. Mechanisms of myocardial contraction and relaxation.
21. Elastic pulmonary traction, negative pressure in the pleural crevice
22. Oxyhemoglobin dissociation curve, factors affecting its course.
23. Heat formation in the body, its regulation.
24. Neurohumoral (gastric and intestinal) phase of regulation of gastric secretion. Enteral stimulators and inhibitors of gastric secretion.
25. Absorption in the alimentary canal. Mechanisms of absorption of sodium ions, water, carbohydrates, proteins, fats
26. The role of the kidneys in providing isovolumia
27. Physiological foundations of sports. Principles of building optimal training regimes

## 8 List of selective tasks

1. Creation of situational test assignments
2. Creation of multimedia presentations on topics of practical classes
3. Creation of biological crossword puzzles on topics of practical classes
4. Making posters with contours of physiological regulation of functions
5. Participation in the work of the student scientific group
6. Participation in student scientific conferences
7. Organizing and visiting thematic museums
8. Publication of key points of presentations from scientific conferences co-authored with the lecturer

## 9 Discipline features

| Period of teaching | Semester | International disciplinary integration | Year of study | Courses: general training/ professional training/elective |
|---|---|---|---|---|
| 1 semester | 3,4 semester | available | 2 | General training |

## 10 Assessment system and requirements. General system of discipline assessment

Current student performance is assessed according to the 4-point scale (2; 3; 4; 5) during every practical class given the approved assessment criteria for a corresponding discipline. Students should obtain a grade in each topic for further conversion of grades into points due to the multi-point (200-point) scale.
Assessment criteria of current learning activities:
Excellent (5) – students answer correctly to 90-100% of A-format tests (from the Krok-2 database); solve case problems and can generalize the material.
Good (4) – students answer correctly to 70-89% of A-format tests; have necessary practical skills and techniques of their performance in the volume exceeding the required minimum.
Satisfactory (3) – students answer correctly to 50-69% of A-format tests; have an obligatory minimum of research methods.
Failure (2) – students answer correctly to 50% of questions, make significant, serious mistakes while answering and showing practical skills.
Students' independent work related to preparations for practical classroom activities is assessed during current control of a topic during a corresponding class.
A semester Pass/Fail test is assessed due to the two-point scale (Pass/Fail) and 200-point scale by defining the arithmetic average of current grades for each practical class due to the 4-point scale and by its further conversion into points of the 200-point scale. Minimum amount of points that should be obtained by students: 120.
The final control of knowledge in the Physiology discipline is conducted in the form of an exam. The exam is conducted in the form of a written test work with individual options, each one containing 3 theoretical questions.
**https://ieu.edu.ua/docs/rate-of-study.pdf**

## 11 Assessment system and requirements. General system of discipline assessment

Students who have completed all types of work, tasks provided for in the curriculum for the semester in accordance with the discipline, attended all classes provided for in the curriculum, written and submitted a medical history and have an average score for current academic activities of at least "3" (72 points on a 120-point scale) are allowed to take part in the semester final control
**https://ieu.edu.ua/docs/rate-of-study.pdf**

## 12 Admission to final control

The policy of the academic discipline is determined by the requirements that scientific and practical workers make to students in the study of clinical discipline. The condition for a successful educational process is personal compliance of each student of a higher education institution with the rules of behavior adopted both at the university and in society. A future doctor must have a high level of behavioral culture, behave with dignity, tact, and self-control.
The student must be on time for classes and wear academic medical uniform (white coat or surgical suit).
The student must adhere to the schedule of the educational process, come to class prepared on the topic of the class. During the class, the student should not leave the classroom without the permission of the teacher; use a cell phone and other means of communication and information without the permission of the teacher, engage in outside activities, distract other students. When writing different types of papers, students must adhere to the rules of academic integrity.
The teacher must adhere to the curriculum, objectively assess the knowledge and skills of students. During the educational process, the teacher must be aware of anti-corruption measures and not engage in corrupt activities.

## 13 Discipline policy

A student who, for valid reasons, confirmed by documentary evidence, was not subject to current control has the right to undergo current control within two weeks after returning to study.
A student who was absent from classes without valid reasons, did not participate in current control activities, did not eliminate academic debt, is not allowed to take the final semester control of knowledge in this discipline, and on the day of the exam, the academic staff member gives a grade of "not admitted" in the examination record.
Retaking the differentiated test in the discipline is assigned subject to the completion of all types of educational, independent (individual) work provided for by the working curriculum of the discipline and is carried out in accordance with the schedule of liquidation of academic debt approved by the directorate.
**https://ieu.edu.ua/docs/050.pdf**

## 14 Policy of absence and late task performance

Participants in the educational process are guided by the principles of academic integrity
**https://ieu.edu.ua/docs/011.pdf**

## 15 Recommended sources of information

**Primary literature:**

1. Physiology: textbook for students of higher medical education institutions / V.H. Shevchuk, V.M. Moroz, S.M. Bielan [et al.], edited by V.H. Shevchuk. – Edition 2, revised and supplemented. – Vinnytsia: Nova knyha – 2015. – 448 p.
2. V.H. Shevchuk. Physiology: textbook / V.H. Shevchuk. – Vinnytsia: Nova knyha, 2017. – 448 p.
3. V.I. Filimonov. Human physiology: textbook / V.F. Filimonov. – K.: Medicine, 2013. – 816 p.

**Additional literature:**

1. A.S. Rovnyi. Physiology of motor activity: textbook / A.S. Rovnyi, V.A. Rovnyi, O.O. Rovna. – Kharkiv: KhAHI, 2014. – 343 p.
2. N.I. Hodun. Physiology of higher nervous activity: study guide / N.I. Hodun. – Pereiaslav-Khmelnytskyi: O.M. Lukashevych, 2014. – 158 p.

## 15 Recommended sources of information

3. L.S. Vovkanych. Physiological foundations of physical education and sports: study guide: in 2 parts / L.S. Vovkanych, D.I. Bergtraum. Lviv: Ivan Bobersky Lviv State University of Physical Culture, 2013. – 195 p.
4. Human Movement, Structure and Function / Nigel Palastanga, Roger Soames. - 6th ed., 2013. – 652 p.

Information resources
Testing Board – Database of Krok-1 licensed test assignments: http://testcentr.org.ua/

## 16 Tips on successful study during the course

**If you want to succeed in this discipline, you should:**
1. Be active, insistent, curious, consecutive.
2. Be tidy and polite.
2. Systematically prepare for practical classes.
3. Attend lectures and take notes.
4. Accomplish tasks for independent work and present them during the class.
5. Carefully handle department equipment, in particular, microscopes.
6. Attend classes in a medical gown.
7. Solve tests and tasks on your own, work actively during the class.
8. Keep an album and sketch out macro- and micro-specimens.
9. Visit the Krok Center website and focus on medical biology questions.
10. Prepare presentations and crosswords dedicated to the discipline.
11. Take part in student scientific conferences.
12. Be engaged in research activities in scientific groups at the department.