

**Odessa National Medical University
Physiology Department**

**COURSE SYLLABUS
"ROLE OF THE NERVOUS SYSTEM IN REGULATING BODY
FUNCTIONS"**

Amount	4 ECTS credits, 120 hours
Semester, year of study	Semester IV, year of study in postgraduate course - II
Days, time, place	According to the timetable, classrooms 1-5 of the Physiology Department - str. Olhivska, 4.
Teacher(s)	1. Oleksiy Shandra – head of the department, prof., DM 2. Olga Kashchenko – PhD, associate professor 3. Oksana Onufriyenko - PhD, associate professor
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Workplace	Study rooms 1-5 at the Physiology Department - str. Olhivska, 4.
Consultations	Thursday 14.30-16.00 Saturday 09:00 - 13:00 Consultations and rework of missed classes on the Microsoft Teams platform

COMMUNICATION

Communication with postgraduate students is carried out through off-line meetings or under the conditions of distance education using:

- Internet platforms: Microsoft Teams, Google Meet
- messengers: Zoom, Viber, Telegram, Skype
- social networks: Facebook
- website of the department: <http://info.odmu.edu.ua/chair/physiology>
- e-mail of teachers: oleksij.shandra@onmedu.edu.ua
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COURSE ABSTRACT

The subject of study of the discipline is the functions of human organs and systems and the nervous mechanisms of their regulation.

Prerequisites: the discipline "The role of the nervous system in the regulation of body functions" is included in the cycle of disciplines of general education. It is based on the study by the applicants of: medical biology - which provides knowledge of biological processes in the human body and the ability to assess their regularity; medical chemistry - which provides knowledge of human biochemical processes and the ability to assess their condition and role in the human body; biological chemistry - which provides knowledge of the structure and functions of chemical compounds in the human body and the ability to evaluate their activity and role; human anatomy - which provides knowledge of the structure and functions of body organs and systems and the ability to apply the acquired knowledge in clinical practice; histology, cytology and embryology - which provides knowledge of the structure and functions of cells and tissues of organs and systems of the body.

Post-requisites: lays the foundations for students to study pathological physiology, pharmacology, propaedeutics of internal and pediatric diseases, surgery, therapy, hygiene, neurology, medical rehabilitation and social care, which involves the integration of teaching with these disciplines and the formation of skills to apply knowledge of the physiology of nervous regulation in the further process education and professional activity;

The goal of the course is to form general knowledge about the nervous mechanisms of the functioning of human body systems to ensure homeostasis in interaction with the external environment.

Tasks of the discipline:

- to reveal the functioning mechanisms of the main physiological systems of the human body
- to reveal the mechanisms of neuro-humoral regulation of functions
- to form graduate students' general ideas about the mechanisms of adaptation of human and animal bodies to various conditions of the surrounding environment

Expected results

A postgraduate student must know the basic concepts of the nervous mechanisms of the course of basic physiological processes such as breathing, digestion, secretion, metabolism of substances and energy; to acquaint applicants with the regularities of the functioning of nervous and muscle tissue, the regularities of cell irritation, the mechanisms of the occurrence and spread of excitement. Expand the idea of the functions of different parts of the nervous system. To form the practical skills and abilities of a physiological experiment that postgraduate students acquire in the process of studying the discipline according to the EPP (educational and professional program):

- PLR 3 (program learning result) - Interpret and analyze information, correctly evaluate new and complex phenomena and problems with scientific accuracy critically, independently and creatively.
- PLR 6 - Independently and critically analyze and synthesize scientific data.
- PLR 8 - To implement and improve modern research methods in the chosen direction of the scientific project and educational activity.
- PLR 12 - Present the results of scientific research in oral and written form in the scientific community and society as a whole, in accordance with national and international standards.
- PLR 16 - Use ethical principles in working with patients, laboratory animals, observe scientific ethics.
- PLR 17 - Demonstrate academic integrity and act responsibly regarding the reliability of the obtained scientific results.

COURSE DESCRIPTION

Forms and methods of education

The course will be taught in the form of seminars (60 hours) and organization of independent work (60 hours).

Methods of education which used when teaching the discipline: *frontal, individual, explanatory and illustrative. Problem-based teaching* is used by the teacher when solving situational problems using innovative methods (case method and role play). *The partial search (heuristic) method* serves the purpose of gradually bringing applicants closer to the independent solution of typical professional tasks by pre-mastering several ways of solving them. The educational process involves the following **forms of studying the course**: seminars and independent classes under the supervision of a teacher with recommended literature.

Content of the academic discipline

Topic 1. Study of biological regulation. Schemes of biological regulation of functions. The reflex principle of the CNS (central nervous system).

Topic 2. CNS synapses. Their working principles, differences from peripheral synapses. Properties of nerve centers.

Topic 3. Processes of excitation and inhibition in the central nervous system. Their types and mechanisms.

Topic 4. Motor systems of the spinal cord, their organization, coordination mechanisms (convergence, divergence, types of motoneuron inhibition - reverse, reciprocal) and clinical significance. Gamma loop.

Topic 5. The role of the brainstem in the regulation of body functions. Vital centers.

Topic 6. The role of the midbrain in the regulation of body functions. Formation of stereotyped involuntary movements. Decerebral rigidity. Vestibular nuclei.

Topic 7. The role of the reticular formation of the brainstem in the regulation of functions. Descending and ascending influences of the reticular formation of the brainstem, the work of Magoun and Moruzzi.

Topic 8. The role of the cerebellum in controlling movements. Ligaments of the cerebellum. Consequences of damage to the cerebellum, their clinical manifestations.

Topic 9. The role of the thalamus and other structures of the forebrain in the regulation of functions.

Topic 10. The role of the basal nuclei in the regulation of muscle tone and complex motor acts. Cycles of the shell and caudate body. Clinical manifestations in damaged basal nuclei, their physiological mechanisms.

Topic 11. Limbic system, its organization, functions. The role of the hypothalamus, hippocampus, tonsils and other structures of the limbic system in the regulation of functions.

Topic 12. The role of the cortex in the formation of the systemic activity of the body. Neural hormonal systems of the brain (noradrenergic, dopaminergic, serotonergic effects). Extrapyramidal and pyramidal ways of coordination of functions.

Topic 13. Central regulation of visceral functions. The role of the brainstem and hypothalamus in the regulation of visceral functions.

Topic 14. Physiological bases of methods of research of electrical activity of the CNS.

Topic 15. Physiological foundations of methods of research of electrical activity of the CNS.

List of recommended literature

Main:

1. Moroz V. M., Shandra O.A. Physiology. 4th ed. Vinnytsya: Nova Kniga. - 2019. - 728p.
2. Costanzo L. S. Physiology. Elsevier. 6th ed., 2017. - 528 p
3. Barrett K. E., Barman S. M., Yuan J., Brooks H. L. Ganong's Review of Medical Physiology. McGraw Hill Professional. 26th edition, 2019. - 752 p.
4. Guyton A., Hall J. E. Textbook of Medical Physiology. Elsevier. 14th Edition, 2021.- 1820 p.
5. Koeppen B. M., Stanton B. A. Berne and Levy Physiology. Elsevier. 7th edition, 2018. - 880 p.

Additional:

1. Sembulingam K., Sembulingam P. / Essentials of Medical Physiology/ Jaypee Brothers Medical Publishers. 8th ed., 2019. - 1186 p.
2. Schmidt F., Thews G. / Human physiology. - 2018. – 1892 p.
3. Ganong's / Medical physiology. – 2019 – 1792 p.
4. Greger R., Windhorst U. / Comprehensive human physiology – 2018 – 1834 p.

EVALUATION

According to the Regulation on the organization of the educational process at the Odessa National Medical University, the results of the academic success of postgraduate students in the discipline "The role of the nervous system in the regulation of body functions" are presented in the form of an assessment on a national scale with conversion to a 200-point scale on the ECTS scale and have standardized generalized criteria knowledge assessment:

- The value of the grade "*excellent*": the postgraduate student shows special creative abilities, knows how to acquire knowledge independently, finds and processes the necessary information without the help of a teacher, knows how to use the acquired knowledge and skills to solve problems, is able to produce innovative ways of solving problems, convincingly argues answers, independently reveals his own gifts and inclinations.

- The value of the grade "*good*": the graduate student has a good command of the studied material, applies it in practice, freely solves exercises and problems in standard situations, independently corrects the mistakes made, the number of which is insignificant.

- The value of the rating is "*satisfactory*": the postgraduate student is able to master a significant part of the theoretical material, but mainly in a reproductive form, demonstrates knowledge and understanding of the main provisions, can analyze the educational material with the help of the teacher, correct errors, among which there are a significant number of essential ones.

- The value of the assessment is "*unsatisfactory*": the postgraduate student has mastered the material at the level of individual fragments, which constitute a small part of the educational material. Only those postgraduate students who have no academic debt and have an average score for current academic activities of at least 3.00 are admitted to the final certification.

Current control is carried out at seminar classes in accordance with formulated tasks for each topic. When evaluating educational activities, preference is given to standardized control methods: oral survey, structured written works, discussions, role-playing games, reports. When mastering each topic for the current educational activity, the student is given grades on a 4-point traditional scale. The current academic performance is calculated as the average current score, i.e. the arithmetic average of all grades received by the graduate student (student) on a traditional scale, rounded to 2 (two) decimal places, for example 4.75.

The conversion of a traditional assessment from a discipline into a 200-point one is performed by the information and computing center of the university according to the formula: the average success score from the discipline x 40. That is, "5" - 185-200 points, "4" - 151-184 points, "3" - 120 -150 points. According to the ECTS rating scale, the achievements of students studying in one specialty are evaluated according to the points they received by ranking, namely: "A" - the best 10% of postgraduate students, "B" - the next 25%, "C" - the next 30% of acquirers, "D" - the next 25%, "E" - the last 10%. Persons who received grades "Fx" and "F" ("2") are not included in the ranked list. Such persons automatically receive an "E" score after retaking.

The grade "Fx" is assigned to students who have scored the minimum number of points for the current educational activity, but who have not passed the final examination. A grade of "F" is assigned to students who have attended all classroom classes in the discipline, but have not obtained an average score (3.00) for the current academic activity and are not admitted to the final examination.

The exam is held at the stage of completion of the postgraduate student's study of the academic discipline, during which the person shows the level of understanding of the program material as a whole, the logic and relationships between individual sections, the ability to creatively use the accumulated knowledge, the ability to form one's attitude to a certain problem of the academic discipline, etc. A postgraduate student is not allowed to take the exam in the discipline, if he has not completed all types of work provided for in the work study plan for the semester in this academic discipline and has not passed the final test control in the discipline.

Individual work

The work program for the discipline provides extracurricular and classroom forms of independent work. During the extracurricular form of independent work, the applicant completes homework, prepares for classes and tests. During independent work under the supervision of a teacher, a postgraduate student takes part in scientific circles, conferences, performs research work, prepares scientific theses, reports, reviews the works of other applicants, participates in competitions, Olympiads, quizzes, production of visual aids, preparation of technical teaching aids. During classroom practical classes, a large part of the time (at least 60%) is devoted to the main stage of the class: independent work under the guidance of the teacher with professionally-oriented tasks (real objects of future professional activity - situational tasks, laboratory research results, radiographs or their models). The rest of the time is for analysis and joint discussion of the results of independent work with error correction. Independent work, which is provided by the topic of the lesson along with classroom work, is evaluated during the current control of the topic in the corresponding lesson. Mastering topics that are presented only for independent work is checked during the exam or differential assessment

COURSE POLICY

Deadlines and Rescheduling Policy:

According to the Regulation on the organization of the educational process at the Odesa National Medical University (<https://onmedu.edu.ua/wp-content/uploads/2020/01/osvitnijproces.pdf>) tasks must be completed on time according to the established deadlines. For untimely completion of the assignment, the graduate student receives an unsatisfactory grade. If the student of higher

education was absent from classes for any reason, then the practice is carried out within the established time limits in accordance with the Regulation according to the approved schedule: during the semester - twice a week (on a working day from 2:30 p.m. to 4:00 p.m. and on Saturday - a day of practice and consultations from 9:00 a.m. until 13.00).

Academic Integrity Policy:

Observance of academic integrity by students of education involves:

- independent performance of educational tasks, tasks of current and final control of learning results (for persons with special educational needs, this requirement is applied taking into account their individual needs and capabilities);
- references to sources of information in the case of using ideas, developments, statements, information;
- compliance with the legislation on copyright and related rights;
- provision of reliable information about the results of one's own (scientific, creative) activity, used research methods and sources of information.

Unacceptable in educational activities for participants of the educational process are:

- the use of family or official ties to obtain a positive or higher grade during any form of control of learning outcomes or advantages in scientific work;
- use of prohibited auxiliary materials or technical means (cheat sheets, notes, micro-earphones, telephones, smartphones, tablets, etc.) during control measures;
- passing procedures for control of training results by fake persons.

Attendance and Tardiness Policy:

Postgraduate students are required to attend all classes. According to the statute and rules of the internal procedure for persons studying at the university, to fulfill the schedule of the educational process and the requirements of the curriculum, in particular:

- attend all classes provided by the program;
- do not be late for classes, come to classes according to the class schedule;
- within two days, in any convenient form, inform about the reasons that make it impossible to attend classes and perform other tasks provided for in the educational program.

Mobile devices: The use of mobile devices is prohibited during the class

Behavior in the classroom: In the classroom, the graduate student must behave in accordance with the rules of ethics and rules of conduct specified in the Regulations on the Organization of the Educational Process at ONMedU and the Regulations on the Organization of Humanitarian Education and Educational Work at the Odesa National Medical University.