National Pirogov Memorial Medical University, Vinnytsya

SYLLABUS

Discipline for the preparation of a Doctor of Philosophy Degree:

ECOLOGY

Specialty	091 "Biology"
Educational and scientific program	"Biology and Biochemistry", 2024
Level of higher education	Third (educational and scientific)
Academic year	2024-2025
Discipline status (compulsory / elective)	Selective, vocational training cycle
Teaching language	Ukrainian, English
Total load	8 ECTS credits
Course / semester	II, III course / 3, 4, 5, 6 semesters
Compiled (s)	Dr. Biol. Sciences, Prof. V.V. Rodinkova, Dr. Med. Sciences, Prof. I.V. Sergeta
Teacher (s), lecturers	Dr. Biol. Sciences, Prof. V.V. Rodinkova, Dr. Med. Sciences, Prof. I.V. Sergeta
Venue, contacts	Department of Pharmacy Address: 21018, Vinnitsa, Pirogov street, 56. (educational building No. 3), +380432672954 pharmacy@ vnmu.edu.ua

1. DESCRIPTION OF THE DISCIPLINE

ANNOTATION

The educational and scientific level of higher education provides for a person to acquire theoretical knowledge, abilities, skills and other competencies sufficient to develop new ideas, solve complex problems in the field of professional and / or experimental and innovative activities. Education at this level let master the methodology of scientific and pedagogical activities, and also conducting their own scientific research, the results of which should be scientific novelty, theoretical and practical value (Law of Ukraine "On Higher Education", 2014).In this sense, the subject "Ecology" is key for understanding human interaction with the outside world and the processes that occur in the environment and can affect a person, in particular, his health. Therefore, the postgraduate student is given questions of studying the patterns of formation, existence and functioning of biological systems of all levels - from organisms to the biosphere - and their interaction with each other and with the external environment. The discipline acquaints the applicant for higher education with the impact of climate change and air, soil and water pollution on people and plants; discusses the mechanisms of occurrence and spread of ecologically caused and ecologically dependent diseases; considers the importance and measures for the conservation

of biodiversity; introduces the means of waste disposal, aspects of reducing anthropogenic impact on the environment and strategies for mitigating climate change.

Goals and Objectives

The goal of teaching the educational discipline "Ecology" is to ensure that the future specialist masters the ecological laws of the interaction of the human population with the environment, the interaction of living and nonliving components of ecosystems, the functioning of ecosystems and the biosphere, the assimilation of the laws of the influence of natural and anthropogenic factors on the functioning of ecosystems and the biosphere as a whole and on the human body, the formation of skills aimed at the adequate use of measures to prevent environmental pollution and the emergence and spread of ecologically caused and ecologically dependent diseases.

The main objectives of studying the discipline "Ecology" is the formation of a system of knowledge, professional skills, research and innovation activities and practical skills in the course of practical activities in the fields of education and health, environmental protection and environmental monitoring, as well as the study of the peculiarities of the existence of biological systems and humans as in natural conditions, and under conditions of anthropogenic pressure on the environment.

LEARNING RESULTS

After successful study of the discipline, the applicant will be able to:

RS 1. Demonstrate the continuous development of his own intellectual and general cultural level, self-realization of the

RS 2. Interpret and analyze information using the latest information technologies

RS 3. Identify unsolved problems in the subject area, formulate questions and determine their ways decision of

RS 4. Formulate scientific hypotheses, goals and objectives of research

RS 5. Develop a design and plan for research

RS 6. Perform original research

RS 7.Explain the principles, specificity and sensitivity of research methods, information content of selected indicators

RS 8. Own, improve and introduce new research methods in the chosen direction of the scientific project and educational activities of the

RS 9. Analyze the results of scientific research, use the methods of statistical research

RS 10.Use the results of scientific research in the educational process, medical practice and nursing

RS 11. To present the results of scientific research in the form of presentations, poster reports, publications

RS 12. Develop communication in the professional environment and the public sphere

RS 13. Organize the educational process of

RS 16. Observe ethical principles when working with patients , laboratory animals

RS 17. Observe academic virtue, be responsible for the reliability of the scientific results obtained

2. DISTRIBUTION BY TYPES OF ACTIVITIES AND HOURS OF TRAINING

Type of activity	Hours
Practical training	240
Biological practice	60

Independent work	90
Total	240

3. Thematic plan

No.	Names of informative modules and topics
1.	Ecology as a science and academic discipline, subject, tasks, basic environmental laws. The history of the development of ecology and its current state. Ecology structure autecology, demecology and synecology. Biospherology. Applied ecology and its branches.
2.	Great history of the Earth and the formation of anthropogenic impact. Great history of the Earth. Geological epochs, the emergence and development of life. Human evolution, the formation of human groupings. Collective learning and knowledge transfer. Evolution of the relationship between man and the natural environment. Man, as the main modern force, transforms the environment.
3.	Environment. Global problems of ecology. Living matter of the geosphere, its properties and functions and ecological characteristics. Environmental factors, their classification and impact on living organisms. Environmental Tolerance Law. Zone of environmental tolerance and its main areas. Natural and man-made disasters.
4.	Biosphere. Population ecology. Biosphere, its structure and properties. The atmosphere, its structure, environmental significance. Hydrosphere, its structure, ecological significance. Lithosphere, structure, chemical and physical properties, function. Population as a biosystem, its structure, features of formation and development. Habitat, abundance and population density. Spatial structure of the population. Population genetics. The sex structure of the population and its types. Reproductive strategies. Fertility and mortality. Survival. Population dynamics.
5.	Ecological systems, biogeochemical circulation of substances and energy in nature. Ecological systems. The structure of the socioecosystem. The main types of interaction between species. Food chains, ecological pyramids and their types. Energy and material flows in ecological systems. Biogeochemical cycles. Methods for the determination of dissolved oxygen, ammonium nitrogen, nitrite and nitrate nitrogen in water.

6.	The main sources, routes and scale of pollution with harmful chemicals of the atmosphere, hydrosphere, lithosphere. Environmental problems and environmental protection. Protection of the environment from chemical pollution of the industry. Pollution: sources, routes, scales. Classification of pollutants. Sources of pollution. Monitoring of changes in the state of the environment. Calculation of MPE and the effectiveness of atmospheric protection structures. Methodology for calculating PDS and the effectiveness of water protection structures. Sanitary cleaning of populated areas. Problems of air pollution and protection. The state of the air environment in Ukraine. Problems of pollution and protection of the hydrosphere. Ecological problems of the largest rivers of Ukraine, the Black and Azov seas. Problems of pollution and soil protection. The current state of natural resources in Ukraine.
7.	Energy pollution of the environment. Protection of the environment under the influence of noise, vibration, electromagnetic field, ionizing radiation. Energy pollution of the environment. Methods for protecting the environment from energy pollution. Radiation monitoring. Computational methods for assessing radiation safety and population protection parameters. Radiation ecology. Consequences of the accident at the Chernobyl nuclear power plant. Nuclear energy prospects. Renewable energy sources. "Green" energy and features of its development in Ukraine and in the world.
8.	Biotechnology. Genetic and Cell Engineering. Scientific foundations of biosafety. Current state and prospects of nanotechnology.
9.	Regulatory framework for environmental protection and environmental protection measures for the environment. The problem of nature protection. The main principles of the preservation of the habitat. Methodology for environmental impact assessment at chemical and pharmaceutical enterprises. Environmental disasters of the enterprise. Biodiversity. Reasons for the prevalence and abundance of the species. The reasons for the extinction of species. The basic principle of conservation of species diversity. Criteria for the selection of species for protection and conservation. Nature reserves and their classification. Principles of rational nature management; main types of protected areas; Red books.
10.	Human ecology. Adaptation. Urboecology. The laws of human adaptation to various environmental conditions. Urboecology and its principles. Problems of urban greening.
11.	Ecology and health. Influence of abiotic, biotic and anthropogenic factors on human health and life expectancy. Stress and the principles of healthy longevity. Environmentally related and environmentally related diseases. The impact of the denatured biosphere on human health. Side effects of medicinal substances on the environment and human health. Final lesson.

4. LEARNING METHODS: lecture, explanation, conversation, research organization, practical task, story, illustration, observation, laboratory research work (biological practice), educational discussion, dispute, discussion of any issue of educational material, cognitive

games by modeling life situations of interest to academic subjects, creating a situation of interest in the process of teaching, creating a situation of novelty of educational material, reliance on life experience.

5. **Final control of the discipline -** exam

FORMS OF ASSESSMENT

Verbal control: main question, additional, auxiliary; a question in the form of a problem; individual, frontal and combined survey; evaluation of the results of protection of the results obtained during biological practice; written control; programmable control.

6. ASSESSMENT SYSTEM

Final control form for the exam: the applicant's discipline grade consists of the sum of the current control points and the points received for the exam.

The form of current monitoring of progress: the sum of points of current monitoring is determined based on assessments of the applicant's on-line performance from all topics according to the traditional 4-point system (excellent, good, satisfactory, and unsatisfactory)

7. Evaluation Criteria Evaluation Criteria for the

Criteria of evaluation of the success of every theme:

The "excellent" is given when the applicant knows the content of the topic of the lesson in full, illustrating the answers with a variety of examples; gives comprehensive, accurate and clear answers without any leading questions; presents the material without errors and inaccuracies; freely solves problems and performs practical tasks of varying degrees of complexity, independently generates innovations and ideas.

The mark "good" is given on the condition that the applicant knows the content of the topic of the lesson and understands well, answers the questions correctly, consistently and systematically, but they are not exhaustive, although the applicant answers additional questions without errors; solves all problems and performs practical tasks, feeling difficulties only in the most urgent cases.

The mark "satisfactory" is given to the applicant on the basis of his knowledge of the entire content of the topic of the lesson and with a satisfactory level of his understanding. The job seeker is able to solve modified (simplified) problems with the help of leading questions; solves problems and performs practical skills, feeling difficulties in simple cases; It is NOT easy to independently systematically state the answer, but answers the directly posed questions correctly.

The mark "unsatisfactory" is given in cases when the knowledge and skills of the applicant do not meet the requirements of the "pre-determined" mark.

Assessment of independent work.

Evaluation of the independent work of applicants, provided for in the topic next to the classroom work, is created during the current control of the topic in the corresponding practical lesson. The assessments of topics that are taken out only for independent work and are not included in the topics of classroom training sessions are controlled during the examination / differential test.

Criteria for assessment during the exam:

The mark "excellent" (80-71) is given in the case when the applicant, during the interview and completing the assigned task, answered all the questions posed (by the examiners in the case of the exam) on the discipline in full, can illustrate the answers with a variety of examples; gives comprehensive, accurate and clear answers without any leading questions;

presents material without errors; freely solves problems and performs practical tasks of varying degrees of complexity, independently generates innovations and ideas. Within the range of points, the assessment takes into account individual insignificant inaccuracies.
The mark "good" (70-61) is given on the condition that the applicant, during the interview and the performance of the assigned task, corresponds well and understands well all the discipline question posed (by the examiners), the answers to the questions are stated correctly, consistently and systematically, but they are not exhaustive, although the applicant answers additional questions without errors; solves all problems and performs practical tasks, feeling difficulties only in the most urgent cases. Within the range of points, the evaluation takes into account the individual errors made.
The mark "satisfactory" (60-50) refers to the applicant on the basis of his knowledge of all the content of the questions posed (by the examiners) during the interview, completed the assigned task and demonstrated an adequate level of understanding and skills. The job seeker is able to solve modified (simplified) problems with the help of leading questions; solves problems and performs practical skills, feeling difficulties in simple cases; It is NOT easy to independently systematically state the answer, but answers the directly posed questions correctly. Within the range of scores, the evaluation takes into account the number of errors made.
The mark "unsatisfactory" is given in cases when the knowledge and skills of the applicant do not meet the requirements of the "pre-determined" mark.

The total of points for all types of educational activities	ECTS scores	National scale score (for exam / differential test)
180-200	A	excellent
170-179,9	B	well
160-169,9	C	
141-159.9	D	satisfactory
122-140.99	E	
	FX	unsatisfactory with re-composition
	F	unsatisfactory with compulsory re-study of the discipline

8. METHODOLOGICAL SUPPORT: educational content, plans for practical (seminar) classes, independent work, questions, methodological instructions, tasks or cases for the current and final control of the knowledge and skills of applicants, web resources, a set of microscopic air samples from 2009-2021 from the laboratory database study of allergenic environmental factors VNMU (LVAFD), reference samples of pollen and fungal spores LVAFD, a Leica microscope, equipped with a camera, and licensed computer software purchased by VNMU, which is on the balance of LVAFD.

9. DISCIPLINE POLICIES

The implementation of educational tasks and work in the discipline must comply with the requirements of the "Code of Academic Integrity and Corporate Ethics of VNMU named after M.I. Pirogov "(https://www.vnmu.edu.ua/downloads/other/kodex_akad_dobro.PDF).
The procedure for distance learning is regulated by the Regulation on the introduction of elements of distance learning at VNMU N.I. Pirogov(https://www.vnmu.edu.ua/General information / Basic documents). The main training platforms for conducting training sessions are Microsoft Team, Google Meets. The procedure for conducting practical classes and lectures, practicing and consultations in distance learning is published on the website of the department(https://www.vnmu.edu.ua/department-pharmacy/To_the_graduate_student or https://www.vnmu.edu.ua/pharmacy/Novini).
Working off missed classroom lessons, re-passing control measures, as well as procedures for appealing the results of control measures are carried out in accordance with the "Regulations on the organization of the educational process for applicants for the degree of Doctor of Philosophy in Vinnitsa National Medical University. M.I. Pirogov "(https://www.vnmu.edu.ua/downloads/other/pologPhD_org.pdf)

10. EDUCATIONAL RESOURCES The

educational and methodological support of the discipline is published on the website of the department. The route of obtaining materials https://www.vnmu.edu.ua/ Department of Pharmacy / Postgraduate student

LITERATURE

Basic

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5. Orel S.M., Malovanovyj M.S., Orel D.S. Assessment of ecological risk. pouring into the health of the people. Navchalnyy pos_bnik. - stereotype not seen, 2018 .-- 232 p.
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17. Hygiene and human ecology: a textbook for students of higher medical institutions / Ed. V.G. Bardova. - Vinnytsia: Nova Kniga., 2008 .-- 720 p.

Additional information

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Information resources:

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The syllabus from the discipline "Ecology" was discussed and approved at the office of the Department of Pharmacy of the Vinnytsia National Medical University. M.I. Pirogov "__24__" April, 2023, protocol No. 17