Syllabus

Program of educational discipline

Ecology

Code and name of specialty
141 Electric power engineering, electrical engineering and electromechanics

Institute
Educational and Scientific Institute of Mechanical Engineering and Transport

Educational program
Electrical energy

Department
Occupational and environmental safety (144)

Level of education
Bachelor

Type of discipline
Special (professional), Mandatory

Semester
2

Language of teaching
English

Teachers, developers

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Candidate of Technical Sciences, Associate Professor, Associate Professor of the Department of Occupational Safety and the Environment of NTU "KhPI".
Teaching experience - 23 years. Author and co-author of more than 69 scientific and educational and methodical publications, the main courses he teaches: "Theory of combustion and explosion", "Ecology", "Fundamentals of ecology","Assessment of impact on the environment", "Occupational safety in professional activities ".
Learn more about the teacher on the department's website
https://web.kpi.kharkov.ua/safetyofliving/uk/prepod/

General information

Abstract

The course "Ecology" covers research on the regularities of the functioning of ecosystems and human interaction with nature, rational nature use and methods of environmental protection from anthropogenic influences. During training, students learn about the patterns of interaction of organisms with the environment, theories of the origin of life, changes in nature by man, methods of caring and preservation of natural resources, methods of environmental protection.

Purpose and objectives of the disciplines

The student's acquisition of competence, knowledge, abilities and skills for the implementation of professional activity by specialty regarding the regularities of human interaction with nature, effective management of environmental protection and application of protection methods the environment from negative anthropogenic loads; development of environmentally safe technologies, as well as increasing environmental awareness and the level of environmental awareness among future specialists of knowledge.

Format of classes

Lectures, laboratory work, independent work, consultations. Final control - exam.

Competences

CG03 Ability to identify, pose and solve problems.
CG 04 Ability to apply knowledge in practical situations.
CG 14 The ability to preserve and multiply moral, cultural, scientific values and achievements society based on an understanding of the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society, engineering and technology, use different types and forms of motor activity for active recreation and driving healthy lifestyle.
SC03 The ability to apply trends in the development of equipment and technology for human protection, material values and the environment from man-made and natural hazards and justified choice of means and systems for protecting people and the environment from hazards.
SC07 The ability to reasonably choose and apply methods of determination and control actual levels of negative impact of impressive factors of sources of extraordinary situations on man and the environment.
SC08 The ability to present the results of one's engineering activities in compliance with generally accepted norms and standards.

Learning outcomes

LO06 Create and theoretically substantiate the designs of machines, mechanisms and their elements based on the methods of applied mechanics, general design principles, the theory of interchangeability, standard methods of calculating machine parts.
LO11 Determine physical, chemical, biological and psychophysiological harmful production factors and analyze the safety of production equipment.
LO12 Determine the technical condition of external and internal engineering networks and structures for assessment of compliance with the requirements of civil protection and man-made safety.
LO16 Choose optimal methods and use means of protection against the influence of negative ones factors of chemical, biological and radiation origin.

Scope of the discipline

The total volume of the discipline is 90 hours. (3 ECTS credits): lectures – 16 hours, laboratory work – 16 hours, independent work – 58 hours.

Course prerequisites

To successfully complete the course, you must have knowledge and practical skills from the following discipline: "Chemistry", "Physics", "Mathematics".

Features of the course, teaching and learning methods, and technologies

Lectures are held interactively with the use of multimedia technologies. Practical classes use a project-based approach to learning, game methods, and focus on the application of information technologies in labor protection.

Program of educational discipline

Lecture topics

Topic 1. Environment and scientific and technological progress
Origin, history of development, purpose and tasks of ecology. Subject of study. The main ecological ones concepts and laws.
Topic 2.. Biosphere.
General characteristics and structure of the biosphere. Evolution of the biosphere. The role of living matter. Processes occurring within ecosystems.
Topic 3. Environment and living conditions of organisms. Populations and groups.
Conditions of existence of organisms. Adaptation to abiotic environmental factors
Topic 4. Environment and living conditions of organisms. Populations and groupings (continued).
Population dynamics. Interaction of populations in groups.
Topic 5. Natural and anthropogenic factors affecting the biosphere.
Natural factors. Anthropogenic influence. Environmental crises and revolutions.

Technosphere. Modern ecological situation.
Topic 6. Protection of the natural environment from anthropogenic pollution and rational nature management.
Characteristics of active and passive methods of biosphere protection.
Topic 7. Environmental quality management.
Ecology and environmental quality management. International cooperation in the field nature protection.

Topics of the laboratory work

Topic 1. Research of the greenhouse effect.

Topic 2. Study of air dustiness.

Topic 3. Studies of the content of harmful gases and vapors by the express method.

Topic 4. Research of the main indicators of water quality.

Topic 5. Study of pH and neutralization of wastewater.

Topic 6. Adsorption as a method of wastewater treatment.

Topic 7. Protection against ionizing radiation. Protective screens.

Topic 8. Protection against ionizing radiation. Protective screens (continuation).

Topics of the practical work

Practical work within the discipline is not provided.

Independent work

Additional materials (textbooks) are recommended to students for independent study and analysis of issues submitted for independent study. The results are drawn up in a written report, presentations.

Literature and study materials

Basic literature

Solomenko L.I. General ecology: a textbook / L.I. Solomenko, V.M. Bogolyubov, A.M. Voloch ; kind. second edition and additional – Kherson: OLDI-PLUS, 2018. – 352 p. Solomenko_Bogolubov_Zagalna ecology.pdf (nubip.edu.ua) Solomenko_Bogolubov_Zagalna ecologij.pdf (nubip.edu.ua)
Vinichuk M.M. In the 20th general ecology: a study guide, the second edition, corrected and supplemented – Zhytomyr: Publishing House of the State University "Zhytomyr Polytechnic", 2021. - 184 p. CONCLUSION (ztu.edu.ua)
Principles of Ecology.– synopsis of lectures on ecology http://web.kpi.kharkov.ua/safetyofliving/uk/posibnyky-pidruchnyky/2/
Modern technologies of atmosphere protection. Study guide for students of higher education institutions of ecological profile / Incl. S.A. Martynenko, - Kropyvnytskyi: National Technical University, 2019. – 155 p. Modern technologies of atmosphere protection. Textbook.pdf (kntu.kr.ua)

Assessment system

Criteria for assessing the student's success and distribution of points

100% of the final grade consists of assessment results in the form of credit (30%) and current assessment (70%).

Assessment: written assignment (2 questions from theories + problem solving) and an oral report.

Current rating:

2 online tests (15% each), practical work (40%).

Assessment scale

The sum of the points	National assessment	ECTS
90–100	Excellent	A
82–89	Good	B
75–81	Good	C
64–74	Satisfied	D
60–63	Satisfied	E
35–59	Unsatisfactorily (further study required)	FX
1–34	Unsatisfactorily (needs repeated study)	F

Norms of academic ethics and policy of the course

The student must adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI": show discipline, education, benevolence, honesty, responsibility. Conflict situations should be openly discussed in study groups with the teacher, and if it is impossible to resolve the conflict, it should be brought to the attention of the employees of the institute's directorate.

Regulatory and legal support for the implementation of the principles of academic integrity of NTU "KhPI" is posted on the website: http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/

Approval

The syllabus has been agreed

Date of approval, signature

20.09.2023

Head of Department
Sergij VAMBOL

Date of approval, signature
20.09.2023

Guarantor of the educational program
Halyna OMELYANENKO