



Syllabus Course Program



Technogenic and Ecological Safety Management

Specialty
101 Ecology

Institute
Educational and Research Institute of Mechanical
Engineering and Transport

Educational program
Industrial Ecology

Department
Chemical engineering and industrial ecology (154)

Level of education
Master's level

Course type
Selective

Semester
1

Language of instruction
English, Ukrainian

Lecturers and course developers



Nataliia Samoilenko

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Candidate of Technical Sciences, Professor of the Department of Chemical Engineering and Industrial Ecology at NTU "KhPI".
Author and co-author of more than 200 scientific and methodological publications. Conducted courses: "Organization and Management in Environmental Protection", "Technogenic and Ecological Safety Management", "Technology Systems and Engineering Ecology", "Biosphere protection equipment", "Technology for Decontamination and Utilization of Gas Emission Components", etc.

[More about the lecturer on the department's website](#)

General information

Summary

The course addresses issues related to the environmental and technogenic safety management system in Ukraine, assessment of natural and technogenic threats, identification of methods and means of preventing dangerous situations, as well as strategies for environmentally safe production and development of projects for environmental safety of economic activities.

Course objectives and goals

To form among students an understanding of the principles and mechanisms of managing technogenic and environmental safety (TES) in Ukraine and to provide them with knowledge and skills for effective TES management, defining the strategy of natural resource use, as well as eco-engineering design aimed at preventing natural-technogenic threats.

Format of classes

Lectures, practical studies, consultations. Calculated task. Final assessment in the form of an exam.

Competencies

GC-3. The ability to generate new ideas.

GC-4. Competence to develop and manage projects.

SC-1. Awareness of the latest achievements necessary for research and/or innovation in the field of ecology, environmental protection, and sustainable use of natural resources.

SC-2. Ability to apply interdisciplinary approaches in critically analyzing ecological problems.

SC-7. Ability to organize work related to the assessment of the environmental status, environmental protection and nature management optimization, in conditions of incomplete information and conflicting requirements.

SC-8. Ability for self-education and professional development based on innovative approaches in the field of ecology, environmental protection, and balanced nature management.

SC-9. Ability to independently develop ecological projects through the creative application of existing and generating new ideas.

SC-10. Ability to assess the level of negative impact of natural and anthropogenic factors of ecological danger on the environment and human

Learning outcomes

RE-1. Know and understand the fundamental and applied aspects of environmental sciences.

RE-2. Be able to use conceptual ecological patterns in professional activities.

RE-4. Know legal and ethical norms for evaluating professional activities, developing and implementing socially significant environmental projects under conflicting requirements.

RE-11. Be able to use modern information resources on ecology, nature use, and environmental protection.

RE-13. Be able to evaluate the potential impact of technological objects and economic activities on the environment.

RE-14. Apply new approaches to develop decision-making strategies under complex unpredictable conditions.

RE-15. Evaluate environmental risks under conditions of insufficient information and conflicting requirements.

RE-16. Choose the optimal management and/or nature use strategy depending on environmental conditions.

RE-20. Have knowledge of the basics of ecological engineering design and environmental impact assessment.

Student workload

Total amount - 150 hours (5 ECTS credits): lectures - 48 hours, practical studies - 16 hours, self-study - 86 hours.

Course prerequisites

Possession of competencies and learning outcomes provided by the higher education standard for the specialty 101 "Ecology" at the first bachelor's level, as well as general knowledge of natural sciences.

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

Lectures are conducted interactively with the use of multimedia technologies and include the teaching of material based on the principle of problematics. Practical classes use methods of teamwork and collective decision-making. Information and analytical tasks, situational tasks and game methods are used to simulate professional activities.

Program of the course

Topics of the lectures

Topic 1. Theoretical aspects of environmental and technogenic safety

Natural and technological safety as a component of environmental safety. Technogenic safety: the essence and main characteristics. The concept of environmental safety management and its situational model.

Topic 2. Risk and its application to safety.

Risk and its types. Environmental risk. Risk assessment and risk management.

Topic 3. Environmental security in the national security system of Ukraine

The actuality of environmental security in the national security system of the country. Threats and countermeasures to national interests in the environmental sphere.

Topic 4. Legal provision of environmental safety in Ukraine.

General characteristics of legal provision of environmental safety in the country. The mechanism of legal provision of environmental safety.

Topic 5. The main directions of state policy to counteract threats to Ukraine's environmental security

Priority directions of the state environmental policy regarding the neutralization of threats to ecological and technogenic safety of Ukraine. State system of control and management of environmental protection. Socio-economic aspects of environmental safety.

Topic 6. Organization and management of technogenic and environmental safety in Ukraine.

The system of ensuring environmental and natural and technological safety in Ukraine. Environmental monitoring as a basis for management decisions to improve environmental safety.

Topic 7. Environmental emergencies and measures to regulate them.

Emergency situations: classification and levels. Environmental emergency zones (EEZ). Natural disasters of an extreme nature. Measures to regulate the EEZ.

Topic 8. Climatic, biological and ecological-economic security in the system of technogenic and ecological safety management

Climate security of countries. Biological security, measures to ensure it. Environmental and economic security.

Topic 9. Management of environmental safety of regions and cities

Environmental safety of regions and environmental safety management. Management of environmental safety of cities.

Topic 10. Environmental safety management of enterprises

Indicators of environmental safety components at the enterprise. Organization and management of environmental safety at the enterprise.

Topic 11. Technogenic safety management system.

General characteristics of state management of technogenic safety. Technogenic safety management of potentially hazardous facilities. The system of public administration in the sphere of civil protection.

Topic 12. Regulatory and Legal Provision of Technogenic Safety in Ukraine.

Legal and regulatory documents on technogenic safety in Ukraine. International documents on technogenic safety.

Topic 13. Technogenic emergencies.

Sources of hazards and causes of technogenic emergencies. The relationship of technogenic disasters with environmental and social disasters.

Topic 14. Measures to ensure technogenic and environmental safety at the state level

Features of state management of technogenic safety at the present time. State regulation in the sphere of technogenic safety. Recovery plans for Ukraine.

Topic 15. Technogenic safety at the enterprise and safety management

Sources of hazards and main components of technogenic safety (TS) at the enterprise. Organization of TS at enterprises. Technogenic safety in the context of rational use of natural resources and environmental protection.

Topics of the workshops

Topic 1. The current state of environmental and technogenic safety in Ukraine

Topic 2. Management of environmental safety of cities.

Topic 3. Environmental protection measures in the environmental safety management system.

Topic 4. Mechanisms for managing technogenic safety at potentially hazardous facilities.

Topic 5. Assessment of losses from the consequences of technogenic and natural disasters.

Topic 6. Determining risks and their acceptable levels for declaring the safety of high-risk facilities

Topic 7. Development of technogenic and environmental protection measures to improve the technogenic and environmental safety of the enterprise

Topics of the laboratory classes

Laboratory work is not provided in the course.

Self-study

The discipline involves completing an individual calculation task on solving a specific practical problem related to managing environmental and technogenic safety at an enterprise.

Course materials and recommended reading

Compulsory

1. Pro Osnovni zasady (strategiiu) derzhavnoi ekolohichnoi polityky Ukrainy na period do 2030 roku: zakon Ukrainy vid 28.02.2019 r. № 2697 – VIII. Vidomosti Verkhovnoi Rady (VVR). 2019. № 16.
2. Emissions Gap Report 2022. URL: <https://www.unep.org/resources/emissions-gap-report-2022>
3. Sustainable Development Strategy: European Horizons [Electronic resource]: Textbook / I. Yakymenko, L. Petrashko, T. Dyman, O. Salavor, E. Shapovalov, M. Galaburda, O. Nychyk, O. Martyniuk. – K.: NUFT, 2022. – 337 p.
4. Samoilenko N.M., Raiko D.V., Averchenko V.I. Orhanizatsiia ta upravlinnia v pryrodokhoronni diialnosti: navch. posib. /N.M.Samoilenko, D.V.Raiko, V.I.Averchenko. Kharkiv : NTU «KhPI», 2018. 174 s. <https://repository.kpi.kharkov.ua/handle/KhPI-Press/37572>
5. Samoilenko N. M. Rozrobka ta obgruntuvannia pryrodokhoronnykh zakhodiv pidpriemstva [Elektronnyi resurs] : navch.-metod. posibnyk / N. M. Samoilenko, T. B. Novozhylova, A. O. Baranova ; Nats. tekhn. un-t "Kharkiv. politekhn. in-t". – Elektron. tekst. dani. – Kharkiv, 2023. – 86 s. <https://repository.kpi.kharkov.ua/handle/KhPI-Press/64105>
6. Zabezpechennia ekolohichnoi bezpeky: pidruchnyk / M.V. Sarapina, V.A. Andronov, S.R. Artemiev, O.V. Bryhada, O.V. Rybalova. – Kh.: NUTsZU, 2019. – 246 s. <http://repositc.nuczu.edu.ua/handle/123456789/10610>

Recommended

1. Plan vidnovlennia Ukrainy. Vidbudova chystoho ta zakhyshchenoho seredovyscha URL: <https://recovery.gov.ua/project/program/re-build-clean-and-safe-environment>
2. Explore UN Environment Topics. URL: <https://www.unep.org/explore-topics>
3. Rakoid O.O., Bogoliubov V.M., Klepko A.V., Bondar V.I. Environmental monitoring. Textbook. Kyiv: NUBIP, 2023. 332 p

Assessment and grading

Criteria for assessment of student performance, and the final score structure

100% of the final grade consists of the results of the exam (40%) and the semester assessments (60%).
Exam: written assignment and oral report. Current assessment: 2 tests and a calculated task (20% each).

Grading scale

Total points	National	ECTS
90–100	Excellent	A
82–89	Good	B
75–81	Good	C
64–74	Satisfactory	D
60–63	Satisfactory	E
35–59	Unsatisfactory (requires additional learning)	FX
1–34	Unsatisfactory (requires repetition of the course)	F

Norms of academic integrity and course policy

The student must adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI": to demonstrate discipline, good manners, kindness, honesty, and responsibility. Conflict situations should be openly discussed in academic groups with a lecturer, and if it is impossible to resolve the conflict, they should be brought to the attention of the Institute's management.

Regulatory and legal documents related to the implementation of the principles of academic integrity at NTU "KhPI" are available on the website: <http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/>

Approval

Approved by

Date, signature
2023/08/31



Head of the department
Oleksii SHESTOPALOV

Date, signature
2023/08/31



Guarantor of the educational program
Musii TSEITLIN