Syllabus
Course Program

Base sustainable development

Specialty
E2 – Ecology

Institute
Institute of mechanical engineering and transport

Specialization
-

Department
Chemical Engineering and Environment Protection (154)

Educational program
Engineering ecology

Course type
Special (professional) training

Level of education
Master's level

Form of study
Full-time, part-time, distance learning

Semester
1

Language of instruction
Ukranian, English

Lecturers and course developers

Tetiana Tykhomyrova
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PhD, associated professor
Work experience - 16 years. Author and co-author of more than 50 scientific and educational works. English and Ukrainian free speaking and writing . Leading lecturer in the disciplines: "Sustainable development" and "Grant writing and international cooperation in ecology" (in English), "Hydrology", "Soil science"
More about the lecturer on the department's website

General information

Summary

The discipline is aimed at studying the sustainable development concept and its implementation in all spheres of life, as well as the English level.

Course objectives and goals

The students' holistic view formation on society development from the ecological imperative standpoint, taking into account the economic aspect, acquiring knowledge of the country's sustainable development base, the implementation features of sustainable development existing models, and deepening knowledge in special English terminology.

Format of classes

Lectures, practical work, calculation tasks, and consultations. Final control - credit.

Competencies

GC-1. The ability to learn and master modern knowledge.
GC-5. Competence to communicate in a foreign language.
GC-6. Competence to search, process, and analyze information from various sources
SC-2. Ability to apply interdisciplinary approaches in critically analyzing ecological problems.
SC-5. Ability to present knowledge and personal conclusions to both experts and non-experts.
SC-7. Ability to organize work related to the assessment of the environmental status, protection of the environment, and optimization of nature management, 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
SC-11. Ability to integrate modern scientific knowledge to develop and implement effective systems for environmental monitoring and risk management associated with man-made accidents and disasters

Learning outcomes

RE-1. Know and understand the fundamental and applied aspects of environmental sciences.
RE-3. Know the basic concepts of natural science, sustainable development, and scientific methodology at the level of the latest achievements.
RE-7. Be able to communicate in a foreign language in scientific, production, and socio-economic spheres of activity.
RE-12. Be able to evaluate landscape and biological diversity and analyze the consequences of anthropogenic impact on natural environments.
RE-16. Choose the optimal management and/or nature use strategy depending on environmental conditions.
RE-17. Critically analyze theories, principles, methods, and concepts from different subject areas to solve practical problems and ecological issues
RE-22. Possess the skills to develop and implement effective strategies for managing natural resources and preventing negative impacts on the environment, taking into account modern environmental challenges and global trends

Student workload

The total volume of the course is 120 hours (4 ECTS credits): lectures - 32 hours, practical work - 16 hours, self-study - 72 hours.

Course prerequisites

To successfully complete the course, it is necessary to possess the competencies and learning outcomes required by the higher education standard in the specialty E2 "Ecology" of the first bachelor's level, as well as general knowledge of natural sciences and English at a level not lower than B1.

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

Lectures are conducted interactively using multimedia technologies. The practical classes use reproductive and problem-solving learning methods and focus on solving the urgent problems of sustainable development concept implementation into the enterprises' everyday production practice and people's lives.

Program of the course

Academic classes

Lectures

Topics of the lectures	Hours
Topic 1. The origin of the sustainable development concept. History and formation of the sustainable development concept. Basic terms of the sustainable development concept and their translation. The role of the UN in sustainable development concept formation.	6
Topic 2. Ecosystem services and the biosphere crisis Human impact on the planet. The ecological footprint of humanity. Ecological debt.	6
Topic 3. Principles of sustainable development Principles of natural capitalism, green economy, blue economy	4
Topic 4. Sustainable Development Goals No. 1-17 Prerequisites for the emergence and importance of Sustainable Development Goals No. 1-17. Sustainable Development Goals No. 1-17.	6
Topic 5. Main tasks of sustainable development for Ukraine National report "Sustainable Development Goals: Ukraine". Achievability of sustainable development goals for Ukraine by 2030. The impact of the full-scale invasion of Russia on February 24, 2022, on the implementation of sustainable development concept in various spheres of life in Ukraine	6
Topic 6. Circular economy and its significance for the concept of sustainable development The concept of the circular economy. Ukrainian legislation in the field of circular economy. Main problems of implementing the sustainable development concept in the economic realities of Ukraine	4
Total hours	**32**

Workshops

Topics for workshops	Hours	Weighting coefficients *a*
Topic 1. Globalization as a phenomenon and its impact on the environment The concept and origins of globalization. Positive and negative consequences of globalization. Environmental aspects of globalization. Examples of the impact of globalization on the state of the natural environment in Ukraine.	2	0,2
Topic 2. Principles of environmental goals and environmental motivations as principles for ensuring sustainable development The concept of environmental goals, environmental motivations. Philosophical aspects. Moral factors and their interaction with the economic sphere	4	0,3
Topic 3. The role of local environmental action plans for the sustainable development of the country The concept of local environmental action plans, sources of their formation and public access. Analysis of existing local environmental	6	0,3

action plans from the point of view of implementing the concept of sustainable development		
Topic 4. Indicators of Sustainable Development Goals. National aspect The concept of indicators of sustainable development goals. National indicators and their accessibility. Problems of data collection for indicators.	4	0,2
Total hours	**16**	$\sum_{i=1}^{n} a_i = 1$

Laboratory classes

Laboratory work within the discipline is not provided.

Control works

One final test covering theoretical and practical issues of the course. It is a test of the Forms resource on the Office 365 platform

Topics for control works	Weighting coefficients b
Control work	1
Total	$\sum_{i=1}^{m} b_i = 1$

Self-study

The course involves independent study of theoretical material and completion of an individual assignment in the form of an essay, in which the applicant selects, with arguments, the appropriate sustainable development goals for specific projects in various areas of production and consumption, describing the project and its content. The essay is provided in the form of a written report and includes a discussion of the results in practical classes. To perform other types of independent work, additional information materials are offered.

Work on theoretical materials

Topics for self-study	Hours
Topic 1. The role of international organizations in globalization processes	4
Topic 2. The concept of the anti-globalization movement	4
Topic 3. Principles of social organization in space (as a principle of ensuring sustainable development of society)	4
Topic 4. Principles of social organization in time (as a principle of ensuring sustainable development of society)	4
Topic 5. Stages of developing a local action plan for environmental protection	4
Topic 6. Stages of developing a regional waste management plan. Challenges associated with a full-scale invasion	4
Topic 7. The environmental component of each sustainable development goal	4
Topic 8. Features of searching for statistical data for indicators of progress of sustainable development goals	4
Topic 9. The procedure for approving a local action plan for environmental protection	4

Topic 10. Comparison of national and global sustainable development goals. The concept of irrelevant tasks	4
Total hours	**40**

Topics for individual assignments

The requirements for completing the individual task and the deadlines for completion are detailed in the link in the methodological instructions https://repository.kpi.kharkov.ua/handle/KhPI-Press/72794.

Topics for individual assignments

Topic 1. Compliance with the goals and objectives of sustainable development of a certain project, idea, development in the field of environmental protection Arguably select the goals and objectives of sustainable development to which the project, idea, development corresponds (according to the option); analyze the current state of achievement of the selected goals and objectives; analyze the indicators of the specified goals and objectives; make a forecast of changes in the event of a positive result from the implementation of the selected project, idea, development
Total hours **32**

Non-formal education

The elements of non-formal education recommended in the syllabus can be credited according to a simplified procedure without additional validation of results (creation of a subject commission). In addition, a publication (e.g., conference abstract, article in a peer-reviewed journal, or monograph) directly related to the content of the practical assignment may be credited as completion of the corresponding academic assignment, also with the maximum grade. Successful completion of the online course "Sustainable Development Goals - A Global, Interdisciplinary Vision for the Future" may be credited in place of workshop #4. Successful completion of one of the online courses "Gender Responsive Approaches to Water, Sanitation, and Hygiene Post Pandemic", "Water Pollution Management in Achieving SDG Target 6.3" or "Integrated Water Resources Management: Action Planning Course" may be credited in place of the individual assignment with the maximum grade

Recommended training courses, internships

1. Online course "Gender Responsive Approaches to Water, Sanitation, and Hygiene Post Pandemic" https://cap-net.org/grawshpp/

2. Online course "Water Pollution Management in Achieving SDG Target 6.3" https://cap-net.org/wpm/

3. Online course "Integrated Water Resources Management : Action Palnning Course" https://cap-net.org/sdg651/

4. Online course "Цілі сталого розвитку - глобальне, міждисциплінарне бачення майбутнього» https://surli.cc/diftlb

Literature, training materials, and information resources

Main literature

1. Sustainable development/ Tutorial for students of specialty 101 "Ecology", 183 "Techniques and technologies of environmental protection" all studding's forms / T. Tykhomyrova, V.Sebko, V. Babenko. – kharkiv, 2022. – https://repository.kpi.kharkov.ua/handle/KhPI-Press/63071

2. European Stability Mechanism. – URL : https://www.esm.europa.eu.

3. Sustainable development of territories: challenges and opportunities: monograph / Bobrovska O. Yu., Krushelnytska T. A, Prokopenko L. L. [etc.]; ed. by O. Yu. Bobrovska. – Published by International Center for Research, Education and Training. MTÜ. Tallinn, Estonia, 2021. – 234 p. http://surl.li/pgslo

Additional materials

1. Methodological guidance for a practical work "Grant and start-up applications correspondence to sustainable development goals" : on the courses "Ecology" for students of specialty 185 "Oil and gas engineering and technologies" of all educational forms / comp.: T. S. Tykhomyrova, O. V. Shestopalov, T. B. Novozhylova ; National Technical University "Kharkiv Polytechnic Institute". – Kharkiv : FOP Panov A. M., 2023. – 30 p.
2. ICAT (Initiative for Climate Action Transparency) (2020). Sustainable Development Methodology: Assessing the Environmental, Social and Economic Impacts of Policies and Actions, D. Rich, R. Song and K.H. Olsen eds. Washington D.C.: World Resources Institute; Copenhagen: UNEP DTU Partnership. https://ghgprotocol.org/sites/default/files/2022-12/Sustainable-Development-Assessment-Guide-1.pdf
3. Taglioni, C., Moncayo, J.R. & Fabi, C. 2023. Food loss estimation: SDG 12.3.1a data and modelling approach. FAO Statistics Working Paper Series, No. 23-39. Rome, FAO. https://www.fao.org/documents/card/en/c/cc9173en
4. FAO and UN Water. 2021. Progress on the level of water stress: Global status and acceleration needs for SDG indicator 6.4.2, 2021. Rome https://www.fao.org/documents/card/en/c/cb6241en
5. FAO. 2021. Guidance on core indicators for agrifood systems – Measuring the private sector's contribution to the Sustainable Development Goals. Rome. https://www.fao.org/documents/card/en/c/cb6526en

Information resources

1. https://www.undp.org/uk/ukraine/tsili-staloho-rozvytku
2. https://globalcompact.org.ua/tsili-stijkogo-rozvytku/
3. https://sdg.ukrstat.gov.ua/uk/

Grading system

The final grade for the educational component is determined by the lecturer and is based on topics, types of activities, etc., in accordance with the syllabus. It is an integrated assessment of the results of all types of student learning activities. The final grade should reflect all the grades for the different parts of the educational process, taking into account their weighting coefficients k:

Continuous assessment (during workshops, seminars, laboratory classes) k_1	Control works (if any), k_2	Individual assignment (if any), k_3	Final assessment (for courses with exams), k_4
0,35	0,4	0,25	

The sum of the coefficients must be equal to one: $k_1 + k_2 + k_3 + k_4 = 1$. The weighting coefficients for the final assessment are decided by the course developer..
The final grade is calculated using the following formula:

$$G = C \cdot k_1 + K \cdot k_2 + \mathrm{I} \cdot k_3 + E \cdot k_4$$

where: C – weighted average score for the continuous assessment
I – individual assignment grade
K – weighted average score for the continuous assessment
E – final assessment (exam) grade

$$C = \frac{C_1 \cdot a_1 + C_2 \cdot a_2 + \ldots + C_n \cdot a_n}{\sum_{i=1}^{n} a_i}$$

де: a_i - weighting coefficient for each workshop (seminar) or laboratory class.

$$K = \frac{K_1 \cdot b_1 + K_2 \cdot b_2 + \ldots + K_m \cdot b_m}{\sum_{i=1}^{m} b_i}$$

де: b_i - weighting coefficient for each control work.

The assessments for each component (C, K, I, etc.) are based on a 100-point scale in line with the provisions of the "Criteria and System for Assessing Knowledge and Skills, and Rating of Higher Education Students" of the National Technical University "Kharkiv Polytechnic Institute."

The final grade is finalized as the calculated value of *G*, rounded up to the nearest integer.

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

Students 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

30.08.2025 **Head of the department**
Oleksii SHESTOPALOV

30.08.2025 **Guarantor of the educational program**
Eugenia MANOILO