Syllabus

Course Title

UN Sustainable Development Goals and Goal 13 in the energy sector

General Information

A general description of the required education/training, outlining the main objectives and explaining the need for this education/training at the organizational/national/regional level.

The course "UN Sustainable Development Goals and Goal 13 in the Energy Sector" is aimed at developing a systemic understanding of modern challenges related to climate change, energy transition, and the shift toward sustainable development in Ukraine and globally. Special attention is given to the analysis of global megatrends, their impact on economic, social, and environmental development, as well as the study of international initiatives and policies, in particular the European Green Deal and the 2030 Agenda.

The course covers issues related to achieving the UN Sustainable Development Goals, with a particular focus on SDG 7 "Affordable and Clean Energy" and SDG 13 "Climate Action," and examines pathways for decarbonizing the energy sector, improving energy efficiency, and implementing renewable energy sources. It also addresses modern approaches to climate adaptation, strengthening energy resilience, and integrating climate objectives into public and corporate policies.

Special emphasis is placed on innovative strategies and technologies that help minimize negative environmental impacts, as well as on developing skills in risk and opportunity analysis in the field of sustainable development. International experience in implementing effective climate solutions is studied, along with possibilities for its adaptation to the national context of Ukraine.

The training is oriented toward forming professional competencies required for designing and implementing sustainable development strategies, strengthening the resilience of communities and organizations, and fulfilling international climate commitments. Significant attention is paid to cross-sectoral interaction and the role of business, government, and civil society in achieving sustainable development.

As a result of completing the course, students acquire knowledge and practical skills necessary for implementing innovative, environmentally responsible, and economically sound solutions aimed at ensuring long-term sustainability and societal development.

Audience

The primary target audience of the course, as well as any secondary audience that may influence decisions regarding the course structure or content.

The expected level of knowledge and skills of the primary audience (current or minimum required), along with other factors (such as cultural characteristics, level of technical proficiency, access to the internet) that should be considered when planning the course, as they may affect the selection of teaching methods, materials, and approaches to interaction with learners.

Primary audience: The course is primarily aimed at PhD students of universities studying in the fields of "Ecology", "Meteorology and Climatology", as well as related disciplines (including biotechnology and energy). It is important for developing in-depth theoretical knowledge and practical skills in the areas of sustainable development, climate policy, energy efficiency, and the implementation of innovative solutions. The primary audience also includes engineers, technical specialists in the energy sector and renewable energy sources, as well as researchers working on climate and environmental issues. Learners should have basic knowledge of ecological processes, climate change, ecosystems, environmental legislation, as well as skills in working with information and modern digital tools. The training is aimed at developing competencies in the implementation of innovative and energy-saving technologies, risk analysis, and the development of sustainable development strategies.

Secondary audience: The course will also be useful for bachelor's and master's students from various disciplines who seek to integrate sustainable development principles into their professional activities. The secondary audience includes representatives of local self-government bodies, territorial communities, and municipalities who use climate and environmental information for decision-making. In addition, the course is aimed at specialists involved in project management and regulatory analysis in the field of sustainable development. For this audience, skills in strategic planning, evaluating the effectiveness of investments in "green" technologies, and increasing environmental awareness are important. The course supports the development of practical tools for making informed decisions and implementing sustainable initiatives at local, regional, and national levels.

Competencies

Training needs at the individual or organizational/national/regional level, as well as a description of how these needs were identified and recognized as relevant.

The competencies that the training will aim to develop.

C2. Creation, development, and improvement of concepts and strategies for climate change mitigation and adaptation independently or in collaboration with representatives of climate-sensitive economic sectors, public authorities, private enterprises, etc., with the aim of achieving the Sustainable Development Goals.

Learning Outcomes and Performance Criteria

Learning outcomes and performance criteria formulated based on the knowledge and skills to be acquired during the course.

Learning Outcomes

LO2. Critically analyze the historical development and current mechanisms for ensuring sustainable development, assessing political and socio-economic factors influencing sustainable development policy.

LO4. Assess the role and impact of the Sustainable Development Goals, in particular Goal 13 – Climate Action, in promoting the transition to sustainable development across different economic sectors and levels of government.

LO12. Propose innovative strategies for advancing the sustainable development agenda by integrating practices aligned with the UN Sustainable Development Goals into different economic sectors and levels of governance.

Performance criteria:

- Assess the potential impacts of global megatrends on future scenarios and trends in specific contexts.
- Critically evaluate how specific Sustainable Development Goals contribute to the transition to sustainability at global, regional, and local levels.
- Evaluate current sustainable development policies and plans for implementing sustainable practices in a selected sector.

Course Content

Provide a content plan that corresponds to the course aims and learning outcomes. This may be the course outline as presented to students, but not necessarily a full curriculum.

Include a general list of all topics considered necessary for coverage. If you think it helps clarify the situation, indicate what will NOT be covered.

Module 2: Global Megatrends: Driving Forces of Current and Future Changes

- *Lecture 1*. Projections of megatrend impacts on climate strategies.
- *Lecture 2*. Megatrends in the energy sector.
- *Lecture 3*. Potential of biomass use as an energy source.

Module 4: United Nations Sustainable Development Goals in Transitions to Sustainable Development

- *Lecture 1*. Sustainable development: essence, chronology of development, Sustainable Development Goals and their targets.
- *Lecture 2*. Implementation of the Sustainable Development Goals at global, local, regional, and national levels.

- *Lecture 3*. Energy sector development under the transition to sustainable development.

Module 6: Innovative Strategies

- *Lecture 1*. Key directions of innovative strategies for achieving Sustainable Development Goal 13.
- *Lecture 2*. Product, technological, managerial, social, and eco-innovative strategies as tools for achieving Sustainable Development Goal 13.
- *Lecture 3*. Marketing, integrative, political, and financial eco-innovative strategies supporting Sustainable Development Goal 13.

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Teaching and Learning Solutions and their Implementation

List the teaching solutions (teaching methods) that will be used and explain why you have chosen them. For example: classroom-based learning, online learning, blended learning, workplace-based learning, online self-study resources, coaching or mentoring, etc..

For PhD students, blended learning is envisaged:

1. Practical classes: conducted in classrooms, providing PhD students with the opportunity to receive the necessary practical guidance, examples, and assistance from the instructor in completing practical case studies.
2. Lectures: the online format ensures free access for PhD students to educational platforms, opportunities for independent information search, and access to the necessary basic learning materials. It also ensures accessibility for inclusive groups.
3. Independent learning: implemented through processing the received information to solve practical tasks, develop practical case studies, and critically reflect on the identified materials.

A personalized approach enables students to work at their own pace and apply their knowledge more effectively under the guidance of the instructor in completing practical case studies and mastering the materials in full.

Learning Strategies

Consider which learning strategies you will use. Provide justification for why you intend to apply them, including reasons why they will help participants achieve the planned learning outcomes.

Combine different learning strategies to create a diverse learning environment that accommodates different learning styles of participants. This will increase learning effectiveness and help achieve the planned learning outcomes. This section does not require a detailed description of specific activities.

During the course, the following learning strategies will be used:

Classroom learning: provides direct interaction between the instructor and learners through interactive lectures, seminars, discussions, and situation modeling. It promotes a deeper understanding of the material, the development of critical thinking, and the formation of skills in analyzing and discussing solutions to climate and energy challenges.

Online learning: involves the use of digital platforms, video lectures, databases, and educational resources, ensuring flexible access to materials and opportunities for self-paced learning. It promotes the development of information search and analysis skills and is inclusive for different groups of learners.

Blended learning: combines classroom and online formats, creating a balance between interactive engagement and flexibility in the learning process. It ensures more effective learning through the integration of theoretical preparation and practical application of knowledge.

Flipped classroom strategy: involves independent study of theoretical material (video lectures, resources) before classes and active participation during classroom meetings in the form of discussions, analysis, and solving practical tasks. The instructor acts as a mentor and facilitator of the learning process.

Case-based learning: focused on solving practical tasks that simulate real environmental and climate situations. It contributes to the development of analytical thinking, creativity, and decision-making skills.

Project-based learning: involves carrying out individual and group projects related to real problems in the field of sustainable development. It allows the integration of theoretical knowledge with practical skills and prepares learners for professional activities.

Coaching and mentoring: provides individualized support to learners during the educational process, promotes the development of professional competencies, and assists in implementing ideas and preparing to solve practical tasks in the field of sustainable development.

Learning Activities

Describe the main learning activities that will be included, such as lectures, reading, case studies, discussions, exercises, practical tasks, simulations, role-playing, etc.

Also describe the roles of instructors and students during these activities.

The learning process includes a combination of lectures, practical classes, case studies, project activities, and independent work with various forms of engagement: discussions, case analysis, problem-solving tasks, gamification, and work with scientific sources.

Distribution of study time:

- *Lectures* – 20 %: the instructor provides fundamental knowledge, explains theoretical material, demonstrates visualizations and examples, and stimulates discussion; the role of PhD students is active listening, preparing questions, and participating in discussions.
- *Practical classes (seminars and demonstrations)* – 20 %: the main role belongs to students, who participate in discussions, complete practical tasks, discuss case studies, and propose solutions; the instructor acts as a mentor and consultant, coordinates the process, summarizes, and generalizes knowledge.
- *Practical case studies and project activities – 10 %:* students analyze real environmental and climate situations, propose solutions, complete individual and group projects, assess CO2 footprints, determine the vulnerability of the energy sector, and integrate theoretical knowledge into practical scenarios; the instructor provides guidance, explains tasks, and supports constructive group work.
- *Independent work – 50 %:* students study scientific literature, electronic resources, prepared materials, and complete individual assignments, developing skills in critical analysis and research work.

Assessment of Learning

Describe the plan for assessing participants before, during, and/or after the course, including tests, exercises, activities, and projects to be evaluated.

Indicate whether self-assessment or peer assessment will be used. Explain how the assessment is aligned with the learning outcomes.

The following assessment methods are applied:

Essay (research paper) – an in-depth study and critical analysis of lecture and practical-session topics presented in written form. Topics include: megatrends and their impact on the economic, social, and environmental dimensions of sustainable development; assessment of climate change impacts on the energy sector in EU countries and Ukraine; the impact of Russia's military aggression on Ukraine's energy sector; analysis of international climate agreements; sustainable transition toward climate neutrality; global trends in energy transformation; Ukraine's climate neutrality strategies; technological innovations and decarbonization tools in the

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energy sector; the use of renewable energy sources; and European experience in greenhouse gas emissions trading.

Discussions during practical classes – PhD students are engaged in discussing case studies and practical tasks in order to examine their own perspectives and strategic approaches to energy transformation. Participation in discussions is encouraged but is not graded separately.

Tests and theoretical knowledge assessment – reinforcement of learning material is carried out through self-assessment quizzes and a final control test, which allows evaluation of the level of theoretical knowledge acquired during the course.

Practical case studies and projects – instructor assessment includes analysis of completed assignments and projects in terms of the appropriateness of problem-solving approaches, effectiveness and innovativeness of proposed strategies, validity of conclusions, their environmental impact and contribution to the implementation of the Sustainable Development Goals, as well as the creativity and logical presentation of results (in written or presentation form).

Self- and peer-assessment – PhD students evaluate the work of their peers, which contributes to the development of critical thinking and analytical skills.

The combination of these assessment methods ensures a comprehensive evaluation of students' knowledge, analytical abilities, and practical skills, forming the competencies necessary for scientific and professional activities in the fields of ecology, energy, and sustainable development.

Learning Storyboard (Instructional Storyboard)

Use it to create a visual scenario of your blended learning activity.

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Learning Resources and Tools

List the available resources that you will use for different types of learning activities and recommend to students.

Describe the technologies that you will use to implement the learning solutions, including educational technologies and operational equipment (technical equipment, software, collaboration tools).

To implement the learning solutions, a variety of resources and technologies will be used to ensure effective knowledge acquisition and the development of practical skills among PhD students:

1. Learning resources:

- thematic literature, peer-reviewed scientific articles, monographs, textbook chapters, and methodological materials;
- video lectures and preparatory learning materials available on the Moodle platform;
- access to scientific databases (Scopus, Web of Science, ResearchGate) and electronic books from the university library;
- PowerPoint presentations for lectures and practical sessions;
- reports from international organizations (UN, IPCC, Greenpeace), textbooks on sustainable development economics, innovation management, and environmental marketing;
- additional video materials available on educational platforms (YouTube).

2. Educational technologies and tools:

- platforms for distance and blended learning (Moodle, Zoom, MS Teams)
- internet access to information resources;

- collaborative tools for teamwork and discussions (Google Workspace, Miro, Padlet);
- technical equipment for practical and laboratory work, including computers, multimedia projectors, and interactive whiteboards.

These resources and tools ensure the integration of theoretical knowledge with practical skills, support active participation of PhD students in the learning process, and promote the development of critical thinking, research competencies, and interdisciplinary collaboration.

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