Syllabus

Course Title

Climate Change Mitigation and Adaptation Strategies for Ukraine's Construction Sector

General Information

General description of the required education/training, outlining the main objectives and explaining the necessity of the education/training at the organizational/country/regional level

Training/Education is aimed at enhancing professional competence, ensuring students' adaptation to current labor market requirements, and strengthening the competitiveness of an organization, region, or country. The course focuses on minimizing climate risks, improving resource efficiency, and implementing modern environmentally sustainable solutions in the construction sector.

This training is essential for adapting Ukraine's construction industry to climate challenges, promoting the development of low-carbon technologies, and ensuring infrastructure resilience. The implementation of the proposed strategies will contribute to the country's sustainable development, enhance environmental security, and improve the quality of life of the population.

Main Objectives

- Increase awareness of the impact of construction activities on the climate.
- Teach the use of energy-efficient technologies and environmentally friendly materials.
- Develop adaptation solutions for the construction sector.
- Promote the alignment of practices with international climate standards.

Need for Training/Education

National Level: The construction sector makes a significant contribution to Ukraine's total greenhouse gas emissions. Therefore, this training will support the achievement of the country's climate goals and facilitate compliance with international standards.

*Economic Benefits:*The adoption of climate-neutral approaches reduces expenditures on energy resources, building maintenance, and disaster recovery.

*Infrastructure Risks:*Increasingly frequent natural disasters can reduce the durability and lifespan of buildings. Training will help professionals implement adaptive solutions to protect infrastructure from these risks.

*Social Dimension:*The creation of resilient urban environments will improve the quality of life for citizens and reduce negative environmental impacts.

*Technological Progress:*The need to implement advanced technologies and green approaches requires the preparation of a highly qualified workforce.

This training is critically important for adapting Ukraine's construction sector to contemporary climate challenges, advancing low-carbon technologies, and ensuring infrastructure resilience. The implementation of these strategies will support the country's sustainable development, strengthen environmental security, and improve quality of life.

Audience

The main target audience of the course and any secondary audience, if it may influence decisions regarding the structure or content of the course

Expected level of knowledge and skills of the main audience (current or minimally required), as well as other factors (for example, cultural characteristics, level of technical training, access to the Internet) that should be considered when planning the course, as they may affect the choice of teaching methods, materials, and approaches to interaction with the audience

Main target audience of the course: The course is aimed at students studying at the second level of higher education (Master's degree) who: seek to improve their professional qualifications; have obtained a Bachelor's, Specialist's, or Master's degree in another specialty (other than 183 "Environmental Protection Technologies", G2 "Environmental Protection Technologies"); perform tasks that require demonstrating competencies and learning outcomes defined by the higher education standard of the Bachelor's degree level in the specialty G2 "Environmental Protection Technologies".

Secondary audience of Master's students: Employers – define the knowledge and skills requirements for graduates. *Academic* community – lecturers, research supervisors, and other educational institutions. *Government institutions* – regulators and bodies that establish educational standards. *Professional communities* – associations that set industry standards. *Social environment* – motivate learning and support development. *Investors/partners* – provide financial or resource support for research projects.

Expected level of knowledge and skills: The program is developed in accordance with the mission and strategy of the university and is aimed at providing students with advanced theoretical and practical knowledge, skills, and understanding related to project management in the field of environmental protection technologies, enabling them to effectively perform innovative tasks at the appropriate level of professional activity, focused on research and solving complex problems of designing and developing new environmental protection technologies to meet the needs of science, business, and enterprises in various sectors of the economy. It is important to ensure the availability of a stable internet connection, as the course includes online components, interactive webinars, or the use of cloud platforms.

Methods, methodologies, and technologies: Methods for modeling systems and processes of environmental and industrial safety; qualitative and quantitative chemical, physical, physicochemical, and biomedical methods and methodologies. Methods for designing environmental protection systems and technologies.

Tools and equipment: Equipment and instruments required for field, laboratory, and remote environmental pollution research. Environmental protection technologies and treatment equipment (according to the specialization, where applicable).

Approaches to interaction: Ensuring feedback, accessibility of instructors for consultations, and the use of platforms that support group work and interactivity.

Competencies

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

Competencies targeted by the training.

C6. Evaluate and develop climate action plans and resilience strategies, including the analysis of successful case studies, the creation of adaptation strategies, and the integration of climate justice principles to ensure equitable and effective outcomes.

Learning outcomes and performance criteria

Learning outcomes and performance criteria formulated with regard to the knowledge and skills to be acquired during the training process.

LO3. Develop and propose effective adaptation strategies that address specific climate risks, integrating the principles of resilience and sustainable development to enhance the adaptive capacity of affected communities. MAS
LO5. Develop and propose low-carbon solutions across various sectors, including energy, agriculture, and business, incorporating innovative technologies and policies to achieve significant reductions in greenhouse gas emissions. MAS

Course Content

Provide a content outline that corresponds to the learning objectives and outcomes. This may be a course outline as it will be presented to students, but not necessarily a complete curriculum.

Include a general list of all topics that you consider necessary to cover. If you believe it would help clarify the scope, indicate what will NOT be covered.

Module 1
Lecture 1. The Impact of Construction on Climate Change
Lecture 2. The Consequences of Climate Change for Cities and Ecosystems
Lecture 3. The Consequences of the Impact of Construction on the Climate
Practical Assignment No. 1. Analysis of a City's Vulnerability to Climate Change
Practical Assignment No. 2. Development of an Energy-Efficient House Concept
Practical Assignment No. 4. Modeling Temperature Changes in the Urban Environment
Practical Assignment No. 5. Calculation of the Carbon Footprint from Implementing a Circular Economy in Construction
Module 2
Lecture 1. Sustainable Construction and Carbon Emission Reduction
Lecture 2. Green Building as a Key Element of Sustainable Development
Lecture 3. Solutions for Promoting Sustainable Low-Carbon Development
Practical Assignment No. 1. Analysis of Building Energy Efficiency and Energy-Saving Potential
Practical Assignment No. 2. Development of a Green Office Center Concept

Learning Solutions and Methods of Implementation

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

The main approaches, methods, and learning technologies envisaged by the educational and professional program: during the learning process, problem-based learning, student-centered learning, self-directed learning, individual learning, and learning through pre-graduation internship are combined.
The main teaching methods are: explanatory-illustrative, reproductive, problem-based presentation, heuristic, research, and visual methods.
During students' independent work, *a blended learning approach* (a combination of online learning and classroom instruction with a lecturer) is applied.
The main forms of the educational process are: lectures, practical classes, and independent study.

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 the effectiveness of learning and help achieve the planned learning outcomes. This section does not require a detailed description of specific activities.

Active Learning. This strategy includes discussions, group work, problem-solving activities, and case studies, enabling participants to engage more deeply with the material and develop critical thinking skills. Active participation encourages interaction and the practical application of knowledge, ensuring its integration into real-world situations.

Interactive Learning. This approach involves the use of interactive technologies such as simulations, online quizzes, and multimedia resources. The strategy promotes active participant engagement, supports different learning styles, and ensures interactivity and adaptability. It increases interest and allows participants to learn at their own pace.

Individualized Approach. Participants are given the opportunity to work on their own projects or individual assignments. This ensures personalized learning, taking into account each participant's level of preparation, needs, and goals, while stimulating their interest and motivation to learn.

Blended Learning. This approach combines online materials with face-to-face meetings and interactive sessions. The strategy provides flexibility and a variety of learning formats, accommodates participants' time and resource constraints, and promotes effective learning and knowledge acquisition.

Learning Activities

Describe the main learning activities that will be included, such as lectures, readings, case studies, discussions, exercises, practical assignments, simulations, role-playing games, etc.
Also describe the roles of instructors and students during these activities.

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Lectures: The lecturer explains theoretical material and presents examples and diagrams. Students listen, take notes, and ask questions.

Reading: The lecturer recommends sources and assigns tasks for analysis. Students independently study the material and prepare for discussion.

Case studies: The lecturer provides scenarios for analysis and guides the discussion. Students analyze the case, propose solutions, and discuss them in groups.

Discussions: The lecturer moderates the discussion and encourages argumentation. Students express their opinions and justify their positions.

Practical tasks: The lecturer formulates assignments, assesses them, and provides feedback. Students complete the tasks and analyze the results.

Role-playing: The lecturer describes the task and observes. Students simulate roles, interact, and analyze the situation.

Lecturers: Mentors who organize the learning process, explain the material, and provide feedback.
Students: Actively engaged participants who independently study the material, analyze it, and take part in tasks.

Assessment of Learning

Describe the assessment plan for participants before, during, and/or after the course, including tests, exercises, activities, and projects that will be assessed. Indicate whether self-assessment or peer assessment will be used.

Explain how the assessment is linked to the learning outcomes.

The quality assessment system for students' training includes: entry, ongoing, semester, final, and higher education student assessment.
Ongoing assessment – oral and written questioning, evaluation of work in small groups, testing, and defense of individual assignments. Ongoing assessment is carried out throughout the semester during lectures and practical classes and is evaluated as the sum of accumulated points. The main purpose of ongoing assessment is to ensure feedback between academic staff and students in the learning process and to support the management of students' learning motivation. Ongoing assessment is conducted in the form of oral questioning or written rapid control.
Final assessment – exams and credits, taking into account the accumulated points from ongoing assessment.

Storyboard of Learning (Learning Storyboard)

Use this to create a visual scenario of your blended learning activity

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1. Introduction (online)
Goal: Introduce participants to the topic and structure of the course.
Content:
Video lecture with an overview of key concepts.
Interactive presentation with a short test to check initial knowledge.
Tools: LMS platform, interactive tests.
Role of the lecturer: Provide materials, create tests, answer questions.
Role of students: Review materials, complete the test, prepare for discussion.
2. Main part (offline/online)
Goal: In-depth study of the material and practical consolidation.
Content:
Lecture (offline/webinar): Explanation of key concepts.
Case studies: Group work on situation analysis.
Practical tasks: Solving real or simulated problems.
Tools: Chat discussions.
Role of the lecturer: Deliver content, moderate discussions, provide task instructions.
Role of students: Active participation in lectures, task completion, participation in discussions.
3. Practical consolidation (online)
Goal: Check understanding and application of knowledge.
Content:
Completion of an individual practical task (e.g., developing a solution for a case study).
Interactive exercises or self-assessment tests.
Tools: LMS platform, interactive tasks (e.g., H5P).
Role of the lecturer: Evaluate assignments, provide feedback.
Role of students: Independent task completion, reflection on results.
4. Conclusion (offline/online)
Goal: Summarize and assess learning outcomes.
Content:
Discussion: Review of key conclusions.
Final test or presentation of project results.
Tools: Webinar platform, tests or feedback questionnaires.
Role of the lecturer: Moderate discussion, assess results, summarize outcomes.
Role of students: Participate in final discussion, submit final assignments or tests.

Learning resources and tools

List the available resources that will be used for different types of learning activities and recommended to students.

Describe the technologies that will be used to implement learning solutions, including educational technologies and operational equipment (hardware, software, collaboration tools).

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Learning resources:
Online courses and video lectures:
Interactive resources:
H5P: for creating interactive videos, tests, and exercises.
Resources for practical tasks:
Google Docs, Google Slides, Google Sheets: for collaborative work on documents and presentations.
Electronic books and articles:
Google Scholar: for searching scientific articles and resources.
Project Gutenberg: for access to free classical books.
JSTOR, SpringerLink: for access to scientific publications and journals.
Technologies for implementing learning solutions:
Learning Management Systems (LMS):
Moodle, Blackboard, Canvas: for course organization, student progress monitoring, and content creation.
Google Classroom: for managing assignments, feedback, and assessment.
Online communication and collaboration tools:
Zoom, Microsoft Teams, Google Meet: for online classes, video conferences, and group discussions.
Assessment and feedback technologies:
Turnitin: for plagiarism detection and quality control of written work.
Google Forms, Typeform: for creating surveys and tests.
Socrative: for interactive testing and real-time assessment.
Operational equipment and software:
Computers and tablets: for accessing online resources and tools.
Software for editing and data analysis:
Microsoft Office, Google Workspace: for creating and editing documents.
Equipment for online learning:
Webcams, microphones, specialized headphones: for high-quality video communication and recording.
Graphics tablets: for creating drawings and annotations.
Touchscreens and interactive whiteboards: for improving interaction during online classes.

Thus, the integration of diverse learning resources, content creation technologies, and collaboration tools enables the implementation of various teaching methods and effectively supports students in the learning process. It provides flexibility in choosing learning approaches and contributes to more effective knowledge acquisition.