

Course Title

United Nations Sustainable Development Goals and Goal 13

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.

Due to intensive human activity, especially during the industrial era, the Earth's resources have undergone significant depletion. This has led to the emergence of serious problems such as climate change, ocean acidification, biodiversity loss, and environmental pollution with new substances. These phenomena already pose a real threat to the safe existence of humanity. Addressing them is a priority task both globally and for each individual country, as without overcoming these challenges, further sustainable development of humanity will be impossible.

The main objective of the course is to increase awareness of the concept of sustainable development, introduce the key challenges facing humanity, and analyse the causes of their emergence. The course is focused on studying the impact of these challenges on society, the economy, and the environment, as well as on developing an understanding of optimal ways to address them in order to achieve both national and global sustainable development goals.

The necessity of this training is justified at several levels. At the global level, climate change is one of the greatest challenges of our time, requiring coordinated international action to ensure a sustainable future. The knowledge gained will support specialists' participation in international initiatives and the fulfilment of Ukraine's commitments under the Paris Agreement. At the national level, Ukraine is facing increasing climate challenges, in particular due to the growing frequency of extreme weather events and the negative impact of war on ecosystems. Training specialists who understand the Sustainable Development Goals and are capable of implementing climate strategies is a necessary condition for the country's recovery and development. At the regional level, depending on the climatic and environmental characteristics of different regions of Ukraine, there is a growing need for qualified specialists capable of developing and implementing climate adaptation measures and sustainable natural resource management.

The expected impact of this training is to increase awareness of the importance of integrating the Sustainable Development Goals into political, economic, and social strategies. This includes the development of competencies for risk assessment, planning adaptation measures, and implementing solutions to mitigate climate change impacts. Trained professionals will be able to work in the field of sustainable development and support the implementation of regional and national climate strategies, contributing to the sustainable recovery and development of the country.

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), as well as 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 choice of teaching methods, materials, and approaches to interaction with the audience.

The primary target audience consists of PhD students at higher education institutions in Ukraine who are pursuing studies in the field of climate services. The course may also be partially used as a professional development course for specialists in meteorology and climatology, as well as for professionals in other fields whose activities are related to strategically important sectors of the economy that influence the sustainable development of the country and society.

1. Level of knowledge and skills of the primary audience:

Prior knowledge and skills

Participants should have a basic understanding of sustainable development concepts, global environmental issues, and the fundamentals of climatology. For a deeper analysis of the interconnections between the United Nations Sustainable Development Goals (SDGs) and climate challenges, basic knowledge of economics, social sciences, and ecology is also important.

Level of technical proficiency

Participants should possess basic computer and internet skills and be familiar with tools used to access interactive learning platforms (e.g., Moodle). It is desirable that learners have basic skills in data analysis and working with presentations.

Level of English proficiency

An intermediate level of English (B1 or higher) is recommended for working with international research, reports, and economic models.

2. Other factors:

Inclusivity and accessibility:

In the teaching process, different ways of presenting material will be used (text, audio, video, interactive tasks).

Learning materials will be provided in accessible formats, such as large-print text, audio files, or files compatible with screen-reading software.

Students will be given a choice of learning methods that best suit their needs.

Internet access:

The course includes online components, but all materials will be available for download and offline use due to possible limitations in internet access.

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.

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 sectors of the economy, 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 with consideration of the knowledge and skills to be acquired during the learning process.

Performance criteria:

PC1. Identify and determine all factors influencing the regional climate that must be considered when addressing specific tasks.

PC2. Evaluate current sustainable development policies and develop a strategic plan for implementing sustainable practices in a selected sector.

PC3. Select the most appropriate approaches for implementing the Sustainable Development Goals in Ukraine

Learning outcomes:

- LO1. Analyse complex interactions between the atmosphere, land, biological, and oceanic components, including feedback mechanisms in the Earth system, taking into account the impact of human activities on the environment.
- LO2. Critically analyse the historical development and current mechanisms of sustainable development, assessing political and socio-economic factors influencing sustainable development policy.
- LO3. Evaluate future scenarios for the Earth system under different development pathways using climate models and future climate projections, in order to understand potential impacts and promote Sustainable Development Goals-aligned programmes in accordance with the UN Sustainable Development Goals.

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 1: Earth System and its trajectories in the Anthropocene. Overview of the main components of the Earth system, their interactions, and changes under the influence of human activity in the Anthropocene era. Analysis of critical thresholds and global challenges such as climate change, biodiversity loss, and disruption of ecosystem services.

Module 3: Development of the concept of sustainable development. The emergence, evolution, and key stages in the formation of the sustainable development concept. Analysis of the principles, objectives, and role of the United Nations Sustainable Development Goals (SDGs) in addressing global environmental, social, and economic challenges.

Module 5: Future scenarios and pathways for the transition to sustainable development. Consideration of possible scenarios for human development in the context of global challenges. Assessment of transition strategies towards sustainable development through the integration of innovation, green economy, climate change adaptation, and global cooperation.

Teaching and Learning Solutions and Their Implementation

List the teaching solutions (learning 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 the most appropriate option. From a practical perspective, online learning allows this audience to better manage their study time independently. Based on their educational needs, it can be assumed that master's and doctoral students are already well prepared for online learning, as they have developed sufficient self-study skills, time management abilities, and high motivation. However, since relatively complex and integrated learning outcomes must be achieved, it is desirable that learning is supported by the direct application and consolidation of acquired knowledge in practice, which is best achieved in an offline environment.

PhD students are expected to meet with the instructor in person 1–2 times per week to discuss knowledge acquired through video lectures and other materials, and to consolidate and refine skills and competencies. Online learning, which will be predominantly asynchronous, will be monitored by the instructor through forums to facilitate more in-depth discussion of questions arising during the learning process.

Upon completion of the course, a final assessment of learning outcomes will be conducted, and students will be awarded certificates.

Given the current challenging conditions in Ukraine, groups of master's and PhD students may also be offered fully asynchronous online learning with the possibility of synchronous sessions.

In the case of online learning, the educational needs of master's students can be addressed more effectively than in face-to-face formats, as it becomes possible to involve a larger number of experts in relevant fields who would otherwise be unavailable due to their workload. This positively affects the overall effectiveness of learning. In this context, it is essential to ensure the possibility of frequent and targeted communication between the instructor and the student, as a deep understanding of various aspects (climatic, economic, etc.) of emerging problems is required, which can only be achieved through close interaction.

Upon completion of the course, master's students will be awarded certificates.

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 meets 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:

Lectures and reading resources

(Lectures and available international and national resources will help develop a systematic understanding of the concept of sustainable development, the United Nations Sustainable Development Goals, in particular SDG 13, as well as the interconnections between the climate system, economy, and social processes. They provide the theoretical basis for analysing global challenges, sustainable development policies, and future Earth system scenarios, which is necessary for achieving learning outcomes related to critical analysis and evaluation of development strategies);

Case-based learning strategies

(Through the analysis of real cases related to the implementation of SDGs, climate policy, climate change adaptation, and post-war recovery, students will acquire skills in policy and strategy evaluation, identifying key challenges, and finding effective solutions. This approach allows theoretical knowledge to be connected with practical managerial and political contexts);

Discussion-based strategies

(Discussions, briefings, and reflective dialogues will contribute to the development of critical thinking, the ability to analyse complex socio-economic and environmental processes, to argue one's position, and to evaluate different approaches to achieving sustainable development. This is particularly important for developing skills in policy assessment and decision-making);

Project-based learning strategies

(Project development allows the integration of knowledge on SDGs, climate challenges, sustainable development policies, and future scenarios, as well as the ability to create strategic solutions for implementing sustainable practices in specific sectors or regions. This approach directly supports the achievement of learning outcomes related to strategy development and evaluation);

The use of these strategies ensures a learning process that meets two key criteria: flexibility (adaptation to learning conditions and the needs of PhD students) and diversity (combining theoretical, analytical, and practice-oriented approaches).

In addition, the proposed strategies contribute to the development of key competencies, in particular the ability to analyse interactions within the Earth system, assess sustainable development policies, and develop strategic solutions in line with the SDGs.

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 educational activities of postgraduate students will consist of lectures, which will account for approximately **20% of the total time** allocated for the course. Practical classes will be implemented in the form of **analytical tasks (20%), case analysis (30%), and project work (30%)**. Case analysis and the project will also include discussions conducted both during the completion of tasks and after their completion. To assess knowledge by course sections, self-assessment tests and final evaluation tests will be used.

Lecture sessions will include the following topics:

Lecture 1: Planetary boundaries and climate change

Lecture 2: Planetary boundaries and Earth system trajectories in the Anthropocene

Lecture 3: Tipping points and global risks

Lecture 4: History of the sustainable development concept

Lecture 5: Principles and structure of the UN Sustainable Development Goals

Lecture 6: Sustainable development policy and its challenges

Lecture 7: Scenarios for the development of the Earth system up to 2050–2100

Lecture 8: Global cooperation and the future of sustainable development

Cycle of practical classes

The cycle of practical classes is aimed at developing skills in **systems analysis of sustainable development, assessment of climate risks, and formulation of strategic decisions** in accordance with the SDGs, in particular SDG 13. The tasks are comprehensive and integrate several aspects of the course.

Practical class 1: Analysis of planetary boundaries, climate risks, and sustainable development policies

Students carry out a comprehensive analysis of the interconnections between planetary boundaries, climate risks, and sustainable development policies. Based on scientific data and policy documents, they assess the level of environmental threats, identify key factors of human impact on the Earth system, and analyze the effectiveness of existing sustainable development strategies.

Practical class 2: Analysis of development scenarios and formulation of strategic decisions

Students analyze different scenarios for the development of the Earth system in the medium and long term, assessing their potential impacts on the environment, economy, and society. Based on this analysis, they formulate strategic decisions aimed at achieving the Sustainable Development Goals, taking into account risks, uncertainties, and development priorities.

Group project

Topic: “Development of a strategy for implementing the Sustainable Development Goals (with a focus on SDG 13) for a specific sector or region”

The project involves applying knowledge of the Earth system, climate change, sustainable development policy, and future scenarios to develop a practically oriented strategic solution. Students work in groups (2–4 people) to create a strategy for a specific user (local government body, enterprise, or economic sector).

Students’ tasks:

Each group:

1. **Chooses a sector or region**
2. **Analyzes the current state and challenges**
3. **Evaluates sustainable development policies**
4. **Analyzes development scenarios**
5. **Develops a strategy for implementing the SDGs**

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

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

Assessment of learning			
Learning outcomes (LO)	Assessment activities (Task)	Assessment criteria (Criteria)	Weight (%)
LO1 Analyze interactions within the Earth system	Tests (module-based)	Understanding of concepts (planetary boundaries, Earth system), correctness of answers	10%
	Practical class 1	Quality of analysis of interconnections, logic of conclusions, use of scientific approaches	15%
LO2 Critically analyze sustainable development policies	Tests (module-based)	Understanding of the SDG concept, policies, ability to interpret approaches	10%
	Practical class 1	Critical analysis of policies, substantiation of evaluation, relevance of conclusions	15%
	Discussions and case studies	Activity, argumentation, ability for critical thinking	10%
LO3 Evaluate scenarios and develop strategies	Practical class 2	Quality of scenario interpretation, logic of analysis, substantiation of decisions	15%
	Group project	Comprehensiveness of analysis, quality of strategy, justification of decisions, practical relevance	20%
	Project presentation	Clarity of presentation, visualization, argumentation, responses to questions	5%







Overall assessment structure	
Component	Weight
Tests	20%
Practical assignments	30%
Discussions / case studies	10%
Project + presentation	40%

Project assessment criteria	
Criteria	Share in the project
Analysis of the Earth system and risks	25%
Assessment of sustainable development policies	25%
Quality of strategic decisions	30%
Justification and logic	10%
Visualization and presentation	10%

Storyboard of learning (learning storyboard)

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

Сторінборд курсу «Цілі сталого розвитку ООН і ціль 13»: Баланс змішаного навчання

	Очне навчання (Синхронно)	Онлайн-навчання (Асинхронно)												
L01: Аналіз взаємодій у системі Земля	 <p>Лекції про планетарні межі та дискусії Лекції про планетарні межі (Planetary Boundaries) та відериті дискусії щодо механізмів зворотного зв'язку в земній системі.</p> <p><input checked="" type="checkbox"/> Групування <input checked="" type="checkbox"/> Оцінювання</p>	 <p>Опрацювання Шостого звіту IPCC та практична робота Опрацювання Шостого звіту IPCC (AR6), виконання Практичної роботи №1 (аналіз кліматичних ризиків) та проходження модульного тесту.</p> <p><input checked="" type="checkbox"/> Групування <input checked="" type="checkbox"/> Оцінювання</p>												
L02: Критичний аналіз політик сталого розвитку та механізмів ЦСР	 <p>Лекції з історії та принципів ЦСР, обговорення викликів Лекції з історії та принципів ЦСР, обговорення викликів сучасної кліматичної політики та соціально-економічних чинників.</p> <p><input checked="" type="checkbox"/> Групування <input checked="" type="checkbox"/> Оцінювання</p>	 <p>Робота з Глобальною базою даних ЦСР ООН та кейси Робота з Глобальною базою даних ЦСР ООН, проведення ситуаційного аналізу (Case Study) та модульний тест для перевірки розуміння політик.</p> <p><input checked="" type="checkbox"/> Групування <input checked="" type="checkbox"/> Оцінювання</p>												
L03: Оцінка майбутніх сценаріїв та розробка стратегічних рішень	 <p>Лекції щодо сценаріїв до 2100 року та презентації Лекції щодо сценаріїв розвитку системи Земля до 2100 року та фінальні презентації групових проєктів.</p> <p><input checked="" type="checkbox"/> Групування <input checked="" type="checkbox"/> Оцінювання</p>	 <p>Використання інструментів моделювання та проєкт Використання інструментів Scenario Explorer та симулятора En-ROADS, Практична робота №2 (моделювання сценаріїв) та підготовка групового проєкту.</p> <p><input checked="" type="checkbox"/> Групування <input checked="" type="checkbox"/> Оцінювання</p>												
Огляд розподілу балів та основних інструментів курсу	<table border="1"> <thead> <tr> <th>Компонент</th> <th>Вага в оцінці</th> </tr> </thead> <tbody> <tr> <td>Тести та практичні</td> <td>50%</td> </tr> <tr> <td>Дискусії та кейси</td> <td>10%</td> </tr> <tr> <td>Проєкт та презентація</td> <td>40%</td> </tr> </tbody> </table>	Компонент	Вага в оцінці	Тести та практичні	50%	Дискусії та кейси	10%	Проєкт та презентація	40%	<table border="1"> <thead> <tr> <th>Ключові ресурси</th> </tr> </thead> <tbody> <tr> <td>IPCC AR6, UN SDG Database</td> </tr> <tr> <td>Miro, Zoom</td> </tr> <tr> <td>En-ROADS, IIASA Scenario Explorer</td> </tr> </tbody> </table>	Ключові ресурси	IPCC AR6, UN SDG Database	Miro, Zoom	En-ROADS, IIASA Scenario Explorer
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NotebookLM

Learning resources and tools

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

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

For the implementation of the course, a combination of scientific, educational, and digital resources will be used, ensuring access to up-to-date information, analytical tools, and international data in the field of sustainable development and climate change.

1. Educational and scientific resources

- **IPCC Sixth Assessment Report (AR6)** (a key source on climate change, risks, scenarios, and policies; includes the physical science basis, impacts, and mitigation of climate change)
[IPCC AR6 Reports](#)
- **IPCC Synthesis Report 2023**
[IPCC AR6 Synthesis Report](#)
- **UN Sustainable Development Goals (SDGs)**
<https://sdgs.un.org/goals>
- **UNDP (United Nations Development Programme)**
<https://www.undp.org>
- **World Bank Climate Change Knowledge Portal**
<https://climateknowledgeportal.worldbank.org>
- **OECD Climate Policy and Sustainable Development**
<https://www.oecd.org/climate-change/>

2. Climate and socio-economic databases

- **Copernicus Climate Data Store (ERA5)**
<https://cds.climate.copernicus.eu>
- **NASA Climate Data (GISS, EarthData)**
<https://data.giss.nasa.gov>

- **UN SDG Global Database**
<https://unstats.un.org/sdgs/dataportal>
- **Our World in Data (Climate & SDGs)**
<https://ourworldindata.org>
- **IPCC Scenarios Explorer (SSP scenarios)** (Interactive access to SSP scenarios and socio-economic pathways)
[IPCC Scenarios Explorer \(Our World in Data\)](#)

3. Tools for scenario analysis

- **IIASA Scenario Explorer (IPCC AR6 database)** (a database of scenarios with thousands of climate and economic development models)
[IIASA AR6 Scenario Explorer](#)
- **Climate Interactive – En-ROADS Simulator**
<https://en-roads.climateinteractive.org>
- **NGFS Scenario Explorer**
<https://data.ece.iiasa.ac.at/ngfs>

4. Analytical and visualization tools

- **Python (pandas, matplotlib, xarray)**
<https://www.python.org>
- **R (climate4R, ggplot2)**
<https://www.r-project.org>
- **QGIS (GIS аналіз)**
<https://www.qgis.org>
- **Excel / Google Sheets**
<https://www.google.com/sheets>

5. Educational platforms and digital tools

- **Moodle** (learning platform)
- **Zoom / MS Teams** (online classes)
- **Google Drive / OneDrive** (collaborative work)
- **Miro / FigJam** (visualization of system interconnections)
- **Canva / PowerPoint** (presentations)