

Syllabus

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.

The Sustainable Development Goals, adopted at the United Nations Sustainable Development Summit, serve as guiding principles for all countries in addressing the needs of the present while safeguarding the interests of future generations, in particular their need for a safe and healthy environment. Therefore, mastering the techniques for achieving these goals is an essential competence for future researchers, whose work should contribute to ensuring the country's sustainable development. In particular, achieving Goal 13 – climate change mitigation – is a direct responsibility of specialists in integrated water resources management. Successful completion of this educational component requires completion of the educational and scientific program at the Doctor of Philosophy degree level.

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.

PhD students studying in the specialty 103 “Earth Sciences.”

Representatives of management staff and teaching personnel who are undergoing professional development may also participate in the training.

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.

Active climate change poses a threat to urban development and creates a vicious cycle of negative effects. It increases the burden on microclimate regulation and stormwater drainage systems, and significantly affects water resources, in particular by altering the hydrological regime, increasing the risks of floods and droughts, deteriorating water quality, and complicating the provision of stable water supply to the population. This, in turn, complicates the functioning of urban infrastructure and water system management. At the same time, climate change contributes to the deterioration of conditions for certain technological processes and negatively affects public health, which is accompanied by an increased demand for pharmaceutical production. All of this leads to higher energy consumption, intensified thermal pollution of the atmosphere, and increased greenhouse gas emissions, further accelerating global warming.

Today, to ensure the survival of humanity, it is critically important to train scientists capable of adequately responding to climate change, effectively managing water resources under conditions of increasing scarcity and risk, and slowing down the further progression of climate change. As a result of studying this educational component, students will acquire the following competencies:

Integral Competence (IC). The ability to generate new ideas, solve complex problems in professional and/or research-innovation activities in Earth Sciences, apply methodologies of scientific and pedagogical activity, and conduct independent research with scientific novelty and theoretical and practical significance.

SC02. The ability to initiate, develop, and implement complex innovative projects in Earth Sciences and related interdisciplinary fields.

SC10. The ability to conduct original hydrological, agrometeorological, climatological, integrated geographical, meteorological, and oceanographic research when addressing relevant problems, to use modern scientific methods, and to achieve scientific results that generate new knowledge.

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 of the educational component:

LO1. Analyze 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. UN SDG

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

LO3. Identify major global megatrends and their implications for current and future environmental, social, and economic changes, with a particular focus on how these trends affect the sustainability of climate-dependent sectors. UN SDG

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. UN SDG

LO5. Evaluate future scenarios for the Earth system under different development pathways using climate models and projections of future climate in order to understand potential impacts and promote sustainable development programs in line with the United Nations Sustainable Development Goals. UN SDG

LO12. Propose innovative strategies to advance the sustainable development agenda by integrating practices aligned with the United Nations Sustainable Development Goals across various economic sectors and levels of governance. UN SDG

Performance criteria:

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

Assess the potential consequences of global megatrends for future scenarios and trends in specific contexts.

Evaluate current sustainable development policies and develop a strategic plan for implementing sustainable practices in the selected sector (water management).

Critically assess how specific Sustainable Development Goals contribute to the transition toward sustainability at global, regional, and local levels.

Select the best approaches for implementing the Sustainable Development Goals in Ukraine.

Evaluate existing sustainable development policies and implementation plans for sustainable practices in the selected sector (water management).

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.

Module 2: Global megatrends: driving forces of current and future changes

1. Global Framework for Climate Services (GFCS) and its role in the water sector
2. The role of water services in the context of climate change and IWRM
3. Purpose, scope, and functions of the “Water” User Interaction Platform

Module 3: Evolution of the sustainable development concept.

Module 4: United Nations Sustainable Development Goals in the transition to sustainable development.

1. Sustainable Development Goals and Ukraine
2. Concept of the National Sustainable Development Strategy
3. Voluntary National Review of SDG implementation progress in Ukraine

Module 5: Future scenarios and pathways to sustainable development

Module 6: Innovative strategies

1. Innovative strategies for the development of climate services and water resources management
2. River Flow Forecasting Service – Australia
3. North American Drought Monitor System (NADMS) and European Drought Centre (EDC)
4. G-WADI and development of the G-WADI geoserver
5. Summary of activity/project costs

Learning solutions and their implementation methods

Please list the learning 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 resources for self-study, coaching or mentoring, etc.

For Doctor of Philosophy students, classroom-based learning will be used, as it promotes live communication at both verbal and non-verbal levels, which is very important for future lecturers in classroom teaching of students.

Distance learning will be used for rapid consultations as well as for studying selected topics.

A transition to fully remote learning and communication will be implemented in cases of critical necessity (pandemic, deterioration of the security situation). This form of learning is not natural for humans and limits the exchange of non-verbal information. The latter is very important for the future implementation of research outputs and dissemination of information about them.

Most of the learning time will be devoted to extracurricular independent study using video materials, literature sources, presentations, etc., which develops skills in critical information processing, identification of unexplored areas, and filtering out unreliable information.

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 strategies will be used, which allow the learning process to be brought as close as possible to real working conditions of future researchers, in order to develop advanced skills in critical analysis, thinking, creativity, communication, and teamwork.

Lectures provide a foundational level of knowledge on climate change, its impacts on various economic sectors, and currently known approaches to adaptation and mitigation.

Case study analysis allows the examination of specific positive and negative experiences in responding to and influencing climate change, in order to avoid repeating mistakes.

Discussions, including brainstorming sessions, are a key strategy for PhD students to develop non-standard thinking, the ability to listen to and analyze others' opinions, and to make informed decisions regarding climate change adaptation and mitigation.

As a result of such learning, new ideas may be generated that can be included in a PhD dissertation and/or further developed in future work in accordance with academic integrity principles.

Inquiry-based learning helps students deeply engage with adaptation to climate change or its mitigation at different levels of application.

Reading involves the study of literature sources, primarily peer-reviewed journal articles, book chapters, and electronic resources. The latter require particular attention and a critical approach.

Learning activities

Describe the main learning activities that will be included, such as lectures, readings, cases, discussions, exercises, practical assignments, simulations, role-playing games, etc.

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

The course includes up to 16% lectures, 24% practical classes, and 60% independent work. Practical classes involve case analysis, discussions, and problem-solving based on specific inquiries.

In lectures, the role of the instructor is predominant. In practical classes, the instructor acts as a teacher and advisor, while PhD students take the leading role.

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 will be used during the course:

1. Surveys – short tests with yes/no answers or multiple-choice questions;
2. Review – a critical review of a specific issue related to climate change, presenting the student's own viewpoint supported by literature sources, as well as identifying possible counterarguments;
3. Case analysis – writing a mini-manuscript or preparing a presentation based on a given situation, with a possible forecast of its development in the context of climate change.

Learning Storyboard (Instructional Storyboard)

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



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LO1. Аналізувати складні взаємодії між атмосферою, сушею, біологічними і океанічними компонентами, включаючи механізми зворотного зв'язку в системі Земля, з урахуванням впливу людської діяльності на довкілля. UN SDG

Аудиторні заняття

Лекції

Лекції щодо 17 цілей сталого розвитку та ESG-принципів ведення бізнесу

Дискусії

Сократичний семінар
Think-Pair-Share
Групова дискусія з проєктуванням

Дистанційні заняття

Читання

Вивчення додаткових матеріалів щодо 17 ЦСР та ESG-принципів

Тести за вивченим матеріалом

LO2. Критично аналізувати історичний розвиток і сучасні механізми забезпечення сталого розвитку, оцінюючи політичні та соціально-економічні фактори, що впливають на політику сталого розвитку. UN SDG

Аудиторні заняття

Лекції

Лекції щодо Глобальної рамкової програми кліматичного розвитку та обслуговування (GFCS) та її ролі у водному секторі

Дискусії

Групова дискусія з проєктуванням
Групова дискусія та проєктуванням

Дистанційні заняття

Читання

Вивчення додаткових матеріалів щодо впливу змін клімату на водне господарство

Тести за вивченим матеріалом

LO3. Визначити основні глобальні мегатренди та їх наслідки для поточних і майбутніх змін у довкіллі, соціальній і економічній сферах, з особливим акцентом на те, як ці тенденції впливають на сталість кліматично-залежних секторів. UN SDG

Аудиторні заняття

Лекції

Лекції щодо 17 цілей сталого розвитку та ESG-принципів ведення бізнесу

Дискусії

Групова дискусія з проєктуванням
Групова дискусія та проєктуванням

Дистанційні заняття

Читання

Вивчення додаткових матеріалів щодо 17 ЦСР та ESG-принципів

Тести за вивченим матеріалом

LO4. Оцінювати роль та вплив Цілей сталого розвитку, зокрема Цілі 13 – Кліматичні дії, у сприянні переходу до сталого розвитку в різних секторах економіки та на різних рівнях уряду. UN SDG

Аудиторні заняття

Лекції

Лекції щодо Концепції Національної стратегії сталого розвитку в Україні

Дискусії

Групова дискусія з проєктуванням
Групова дискусія та проєктуванням

Дистанційні заняття

Читання

Вивчення додаткових матеріалів щодо Концепції Національної стратегії сталого розвитку в Україні

Тести за вивченим матеріалом

LO5. Оцінювати майбутні сценарії для системи Земля за різними траєкторіями розвитку з використанням кліматичних моделей і прогнозів майбутнього клімату, щоб розуміти потенційні наслідки і просувати програми сталого розвитку відповідно до Цілей сталого розвитку ООН. UN SDG

Аудиторні заняття

Лекції

Лекції щодо 17 цілей сталого розвитку та ESG-принципів ведення бізнесу

Дискусії

Групова дискусія з проєктуванням
Групова дискусія та проєктуванням

Дистанційні заняття

Читання

Вивчення додаткових матеріалів щодо 17 ЦСР та ESG-принципів

Тести за вивченим матеріалом

LO12. Пропонувати інноваційні стратегії для просування порядку денного сталого розвитку шляхом інтеграції практик, що відповідають Цілям сталого розвитку ООН, у різні економічні сектори та на різних рівнях управління. UN SDG

Аудиторні заняття

Лекції

Лекції щодо ролі водних служб у контексті змін клімату та КУВР

Практична робота

Захист інвестиційного проєкту
Розроблення стандарту

Дистанційні заняття

Читання

Вивчення додаткових матеріалів щодо ролі водних служб у контексті змін клімату та КУВР

Тести за вивченим матеріалом



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).

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