Syllabus

Course title

Climate services management in Ukraine

General information

General description of the required training/preparation, which presents the main objectives and provides an explanation of the necessity of training/preparation at the level of the organization/country/region

The course is aimed at developing knowledge and skills in climate services management in Ukraine, including the institutional, political, and practical aspects of their development, implementation, and use.

The course covers the principles of climate services functioning, international and national approaches to their development, as well as mechanisms of interaction between scientific institutions, government bodies, business, and other users of climate information.

Special attention is given to the analysis of users' needs for climate services, the evaluation of the effectiveness of climate services, and their application in various sectors of the Ukrainian economy, in particular water management, agriculture, energy, healthcare, and urban planning.

The course takes into account modern international approaches to climate services development, including the Global Framework for Climate Services (GFCS) and European initiatives in the field of climate services.

General information

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 minimum required), as well as other factors (for example, cultural characteristics, level of technical preparation, access to the internet) that should be taken into account when planning the course, as they may influence the choice of teaching methods, materials, and approaches to interaction with the audience.

The main audience of the course consists of master's students of higher education institutions in Ukraine who are studying in the fields of climate services, climatology, hydrometeorology, ecology, or related disciplines.

The course may also be partially used as a professional development course for specialists in meteorology and climatology, as well as for professionals from other economic sectors whose activities involve decision-making based on observed and forecast climate information.

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

Fundamental knowledge:

Participants of the course should have basic knowledge in natural sciences, in particular geography and climatology, necessary for understanding climate processes and their impact on natural and socio-economic systems.

Basic knowledge of economic theory is also desirable, including an understanding of key economic concepts used in the analysis of climate impacts on economic systems.

Analytical preparation:

Skills in working with economic indicators, risk assessment, and scenario analysis are desirable.

Technical preparation:

Participants should have basic computer and internet skills, as well as experience using online learning platforms such as Moodle.

It is desirable that participants have experience working with spreadsheets and skills in preparing presentations.

English language level:

An intermediate level of English (B1 or higher) is recommended, which will allow participants to work with international scientific publications, reports of international organizations, and analytical materials in the field of climate services..

2. Other factors:

Inclusiveness and accessibility:

During teaching, different methods of content delivery 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 reader software.

Students will be offered a choice of learning methods that best meet 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.

Learning materials will be provided in accessible formats, including text files with scalable font size, audio files, or files compatible with screen reader software.

The course includes online components; however, all learning materials will be available for download, allowing offline use in case of limited internet access.

Competences

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

Competences targeted by the training.

C2. Creation, development, and improvement of concepts and strategies for climate change mitigation and adaptation, independently or in cooperation with representatives of climate-sensitive economic sectors, public authorities, private enterprises, etc., in order to achieve sustainable development goals.

Learning outcomes and effectiveness criteria

Learning outcomes and effectiveness criteria formulated with consideration of the knowledge and skills to be acquired during the learning process.

Performance criterion:

PC1. Analyze the climate services system and identify opportunities for their application in different economic sectors, taking into account existing political, regulatory, and institutional frameworks.

PC2. Identify the needs of users of climate services, interact with stakeholders, and assess the effectiveness of climate services for their further improvement.

Learning outcomes

LO1. Explain the principles of functioning of climate services and analyze their role in supporting decision-making processes in various sectors of the Ukrainian economy, taking into account the political and institutional mechanisms of their development.

LO2. Analyze the needs of users of climate services and apply evaluation approaches to improve their practical applicability.

Course content

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

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

Module 1: Fundamentals and institutional system of climate services management. The concept of climate services and their role in supporting decision-making in different economic sectors. Key components of the climate services system, including climate data, climate information, and climate products. International approaches to the development of climate services, in particular the Global Framework for Climate Services (GFCS). The institutional system for the development of climate services in Ukraine, the role of national hydrometeorological services, scientific institutions, public authorities, and international organizations. Use of climate services in different economic sectors, in particular agriculture, water management, energy, healthcare, and urban planning.

Module 2: User needs and evaluation of climate services effectiveness. Identification and analysis of users' needs for climate services. Methods and approaches for stakeholder engagement in the development of climate services. Consideration of the needs of different user groups in the design of climate products and services. Methods for evaluating the effectiveness of climate services, including analysis of their practical applicability, usefulness, and impact on decision-making processes. Use of evaluation results and feedback for improving climate services and increasing their effectiveness.

Learning solutions and methods of their implementation

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

For postgraduate students, a blended learning format is appropriate, combining online components with periodic in-person or synchronous consultations. This approach allows for effectively combining the flexibility of individual learning with opportunities for in-depth discussion of complex scientific and applied aspects of climate services management.

Given the specifics of postgraduate training, a significant part of the learning can be conducted online, mainly in an asynchronous mode. This allows postgraduate students to independently plan their study time while combining it with research work, dissertation preparation, and participation in scientific projects. Postgraduate students usually have sufficient experience in independent work with academic materials, time management skills, and a high level of motivation for learning.

At the same time, considering the complexity and interdisciplinary nature of climate services management, regular discussion of theoretical concepts, methodological approaches, and practical examples of climate services use is essential. For this purpose, periodic meetings between postgraduate students and the instructor in a synchronous format (online or in person) are planned, during which the results of studying learning materials will be discussed, examples of climate services use will be analyzed, and research tasks will be performed.

Asynchronous online learning includes working with video lectures, scientific articles, analytical reports, and other learning materials available on a learning platform (e.g., Moodle). The instructor will support the learning process through forums, online discussions, and consultations, ensuring continuous feedback between the instructor and postgraduate students.

Upon completion of the course, final assessment of learning outcomes is planned, which may include the preparation of an analytical paper or a research project related to the analysis or evaluation of climate services. Certificates may be issued to postgraduate students upon successful completion of the course.

Considering the current difficult conditions in Ukraine, the training may also be conducted as a fully online course using asynchronous learning materials and the possibility of synchronous online activities.

The online format also creates additional opportunities to involve leading scientists and experts in the field of climate services in teaching, who may deliver guest lectures or participate in discussions. This will contribute to broadening the scientific perspective of postgraduate students and familiarizing them with current international research and practices in climate services.

A particularly important aspect of this format is regular and focused communication between the instructor and postgraduate students, as the study of climate services management requires in-depth analysis of climate, socio-economic, and institutional aspects. Such interaction will help develop students' ability to critically analyze scientific approaches, assess the effectiveness of climate services, and apply acquired knowledge in their own research.

Learning strategies

Consider the learning strategies you will use. Provide justification for why you choose them, including reasons why they will help participants achieve the intended learning outcomes.

Combine different learning strategies to create a diverse learning environment that meets different learning styles of participants. This will increase the effectiveness of learning and help achieve the intended learning outcomes. In this section, it is not necessary to describe specific activities in detail.

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

Lectures and reading resources. Lectures, scientific articles, and analytical reports from international and national organizations will help postgraduate students acquire the necessary theoretical knowledge regarding the concept of climate services, their role in supporting decision-making, as well as the institutional mechanisms for the development of climate services globally and in Ukraine. Working with academic publications and analytical materials will contribute to building a scientific understanding of the principles of creation, functioning, and use of climate services.

Case-based learning strategies. Through the analysis of concrete case studies of climate services implementation, postgraduate students will acquire practical skills in assessing their effectiveness and identifying opportunities for their application in different economic sectors. Case analysis will make it possible to study examples of climate services use in agriculture, water management, energy, healthcare, and other sectors, as well as to identify factors influencing their effectiveness.

Discussion strategies. Scientific discussions, seminars, and debriefings will support the development of critical thinking and analytical skills among postgraduate students. During discussions, participants will analyze current research in the field of climate services, discuss challenges in their application, and formulate evidence-based conclusions regarding the improvement of climate service systems. This format enables the development of academic discussion skills and the ability to formulate well-grounded recommendations.

Project-based learning strategies. The implementation of a research or analytical project will allow postgraduate students to deepen their understanding of climate services management processes, as well as develop skills in analyzing user needs and evaluating the effectiveness of climate services. Within the project work, students may study existing climate services, analyze their use in specific economic sectors, or develop recommendations for their improvement.

The use of these strategies ensures a learning process that meets two key criteria: flexibility (the ability to adapt the learning process to different educational needs of postgraduate students and learning conditions) and diversity (a combination of theoretical, analytical, and research-based learning approaches).

In addition, the proposed strategies meet both academic and practical requirements of postgraduate training, as they contribute to the development of deep scientific knowledge, research skills, and the ability to apply climate services in supporting decision-making processes.

Learning activities

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

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

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The learning activities for postgraduate students will consist of a combination of theoretical instruction, analytical work, and research-oriented tasks. Lectures will account for approximately 20% of the total course time and will be aimed at developing a theoretical understanding of the concept of climate services, their institutional organization, and their role in supporting decision-making processes.
Practical classes will account for approximately 20% of the course time and will take the form of analytical tasks focused on examining climate services, identifying user needs, and evaluating the effectiveness of climate products.
Case studies will account for approximately 30% of the learning time. Within these sessions, postgraduate students will work with real-world examples of climate services used in different economic sectors, analyze their effectiveness, identify institutional barriers, and explore opportunities for improvement.
Project work will account for approximately 30% of the course time. Within this activity, postgraduate students will carry out a mini-research project aimed at analyzing or evaluating a climate service for a specific economic sector or user group.
Case studies and project work will be supported by group discussions conducted both during and after task completion. This will foster critical thinking, scientific argumentation skills, and the ability to formulate evidence-based recommendations.
To assess knowledge of individual course modules, self-assessment and final tests will be used, along with evaluation of analytical assignments and project work.

Lecture topics

1. The concept of climate services and their role in climate risk management systems.
2. International approaches to climate services development: GFCS, WMO, and European initiatives.
3. The institutional system of climate services in Ukraine.
4. Climate services for different economic sectors.
5. Analysis of user needs for climate services.
6. Methods for evaluating the effectiveness of climate services..

Discussion topics

1. What barriers limit the use of climate services in decision-making processes?
2. Do climate services in Ukraine meet the needs of key users?
3. What institutional mechanisms are required for the development of climate services in Ukraine?
4. The role of climate services in climate change adaptation planning.
5. Use of climate forecasts in different economic sectors.

Case study topics

1. **Use of climate services in agriculture.**
2. **Climate services for water resource management.**
3. **Early warning systems for hazardous hydrometeorological events.**
4. **Climate services for urban planning and climate change adaptation in cities.**

Practical tasks

1. Analysis of existing climate services in Ukraine.
2. Identification of user groups of climate information for a specific economic sector.
3. Development of a questionnaire for assessing user needs for climate services.
4. Evaluation of the effectiveness of a climate service based on defined criteria.

Role-playing activity (simulation of stakeholder interaction) “Development of a climate service for a region”

Participants are divided into groups representing:

- scientists
- public authorities
- business sector
- local communities.

The task is to identify user needs for climate information, discuss possible solutions, and formulate proposals for creating or improving a climate service.

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Final project
Postgraduate students complete an analytical or research project entitled: **"Evaluation of the effectiveness of a climate service for a specific economic sector or region of Ukraine.".**
The project includes:

- analysis of user requirements and expectations for climate services;
- evaluation of existing services;
- development of recommendations for their improvement.

Results are presented in the form of a **presentation and an analytical report.**

Assessment of learning

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

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

Matrix of alignment between learning outcomes and assessment methods

Learning outcomes	Assessment methods	Description of assessment
LO1. Explain the principles of functioning of climate services and analyze their role in supporting decision-making processes in different sectors of the Ukrainian economy, taking into account political and institutional mechanisms of their development.	Self-assessment tests	Checking understanding of key concepts of climate services, their structure, and institutional development mechanisms.
	Case study analysis	Analysis of examples of climate services use in different economic sectors and assessment of their effectiveness.
	Participation in discussions	Assessment of the ability to discuss issues related to the development of climate services in a reasoned manner and to analyze scientific sources.
LO2. nalyze the needs of users of climate services and apply evaluation approaches to improve their practical applicability..	Practical tasks	Analysis of user needs for climate information and identification of criteria for the effectiveness of climate services.
	Role-playing (simulation of stakeholder interaction)	Simulation of interaction between scientists, public authorities, business, and communities aimed at developing or improving a climate service.
	Research project	Comprehensive analysis of a climate service, assessment of its effectiveness, and development of recommendations for its improvement.

General distribution of assessment

Type of assessment	Share in the final grade
Self-assessment tests	20 %
Practical tasks	15 %
Case study analysis	15 %
Participation in discussions	10 %
Role-playing	10 %
Final research project	30 %

Learning storyboard (instructional storyboard)

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

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 learning solutions, including educational technologies and operational equipment (hardware, software, and collaboration tools).

1. Climate Change 2022: Impacts, Adaptation and Vulnerability : Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change / H.-O. Pörtner, D. C. Roberts, M. Tignor та ін. Cambridge : Cambridge University Press, 2022. 3056 p.
2. Global Framework for Climate Services: Implementation Plan. Geneva : World Meteorological Organization, 2014. 24 p.
3. Guide to Climatological Practices (WMO-No. 100). Geneva : World Meteorological Organization, 2018. 116 p.
4. Climate Services for Supporting Climate Change Adaptation. Geneva : World Meteorological Organization, 2019. 36 p.
5. Climate Services for Risk Reduction and Adaptation. Geneva : Global Framework for Climate Services Secretariat, 2015. 48 p.
6. Howden M., Dessai S., Anderton S. et al. Adapting to climate change through climate services. Nature Climate Change. 2014. Vol. 4. P. 4–7.
7. Hewitt C., Mason S., Walland D. The Global Framework for Climate Services. Nature Climate Change. 2012. Vol. 2. P. 831–832.
8. National Adaptation Plans: Technical Guidelines for the National Adaptation Plan Process. Bonn : United Nations Framework Convention on Climate Change Secretariat, 2012. 131 p.