Report

Development of Course 3

"Sustainable Pathways and Risk Management in Times of Crises"
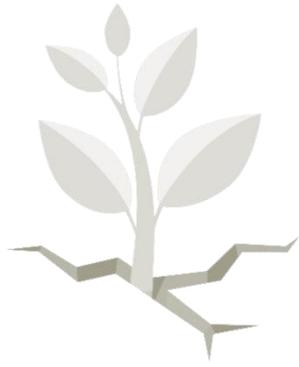
Kharkiv, December 2025

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Development of Course 3

"Sustainable Pathways and Risk Management in Times of Crises"

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Published
Eberswalde, Germany | December 2025

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LIST OF ABBREVIATIONS

Abbreviation	Full Term
C 3	Course 3
ESD	Education for Sustainable Development
EU	European Union
HNEE	Eberswalde University for Sustainable Development
KhNAHU	Kharkiv National Automobile and Highway University
NTU	National Transport University
NUOS	Admiral Makarov National University of Shipbuilding
OSENU	Odessa State Environmental University
PAEW	Professional Association of Environmentalists of the World
PRZ	Rzeszow University of Technology
PSTU	Pryazovskyi State Technical University
Td-r	Transdisciplinary Research
TUL	Technical University of Liberec
UNFU	Ukrainian National Forestry University
Vilnius Tech	Vilnius Gediminas Technical University
WP	Work Package
WP2	Work Package 2: Diagnostics
WP3	Work Package 3: Network Development
WP4	Work Package 4: Course Development
WP5	Work Package 5: Dissemination
ZPSU	Zhytomyr Polytechnic State University

1. Summary

This report has been prepared as part of the Erasmus+ *Transformational Learning Network for Resilience* (**TransLearnN**) and is dedicated to the development, implementation and testing of the course "*Sustainable Pathways and Risk Management in Times of Crises*", aimed at strengthening the capacity of Ukraine's higher education system to react to multiple crisis challenges, taking into account the principles of sustainable development

The aim of the course is to develop the competencies of higher education students in making reasoned decisions in crisis situations, developing sustainable response scenarios, managing environmental, social and economic risks, and maintaining a sustainable development trajectory in conditions of uncertainty and limited resources. The course takes an interdisciplinary approach and combines knowledge of risk management, ecology, climate adaptation, energy and human potential recovery.

The course methodology is based on a combination of competency-based, practice-oriented and transdisciplinary approaches. The development process was carried out in the format of inter-university cooperation with the participation of representatives of partner universities of the *TransLearnN* project. An important stage was the completion of the 'Train the Trainers' training, during which the logical structure of the course was formed and teaching methods were agreed upon. The course combines traditional and interactive lectures, practical classes, case studies, group work, role-playing games and training sessions, ensuring the active involvement of students in the learning process.

The course was tested in practice during the *TransLearnN* Spring School, which included an online theoretical stage and an intensive face-to-face programme at the Technical University of Liberec (Czech Republic). Students, lecturers-developers and international experts from Ukraine and EU countries took part in the pilot. The learning process focused on solving realistic crisis scenarios, interdisciplinary teamwork and the exchange of international experience.

The results of the pilot implementation of the course demonstrated its relevance, practical value and compliance with the current needs of training specialists in the field of risk management and sustainable development. Feedback from students and experts confirmed the effectiveness of the chosen methodology and provided a basis for further improvement of the course by expanding the practical component, integrating digital tools, and strengthening the focus on Ukraine's post-crisis and post-war recovery.

Figure 1: Part of the team at Technical University of Liberec

2. Aims & Structure of this Report

The purpose of this report is to present the development process, content and results of the implementation of the course '*Sustainable Pathways and Risk Management in Times of Crisis*' created within the Erasmus+ Transformational Learning Network for Resilience (*TransLearnN*) project. The report summarises the course objectives, methodological approaches, collective development process, piloting and educational outcomes, with a particular focus on strengthening the capabilities of higher education institutions in Ukraine to respond to multiple crisis challenges in line with the principles of sustainable development.

The report aims to:

- describe the conceptual framework and learning objectives of the course;
- cover the methodology and activities used in the development and piloting of the course;
- present the structure, content and formats of the course;
- summarise the results of the pilot implementation, including feedback from students and experts;
- formulate conclusions and recommendations for further improvement of the course and its integration into university education programmes.

The report has the following structure.

Section 1 provides a brief overview of the report's objectives, methods and main results.

Section 2 defines the purpose of the report and explains its logic and structure.

Section 3 describes the methodological approaches, the course development process and the main learning activities.

Section 4 provides a description of the course, the expected learning outcomes, the implementation experience and the key results of the pilot implementation, in particular within the Spring School.

Section 5 summarises the main results and provides recommendations for the further development of the course and its use in higher education.

Section 6 contains supporting materials, including excerpts from the course and summarised feedback from students and experts.

The structure proposed ensures logical and consistent presentation of material and promotes the dissemination of best practices in education for sustainable development and risk management in crisis situations.

3. Methodology & Activities

The development and implementation of the course 'Sustainable Pathways and Risk Management in Times of Crisis' was based on a combination of interdisciplinary, competency-based and practice-oriented approaches to learning. The methodological basis of the course was the principles of sustainable development, risk-oriented management, transdisciplinary research and transformational learning, which correspond to the objectives of the TransLearnN project and the current challenges facing the higher education system in Ukraine in the context of multiple crises.

The course development process was carried out in the format of inter-university cooperation and included representatives of all partner universities of the project. The working group conducted regular online meetings to discuss the course concept, module structure, learning outcomes, and teaching methods. An important stage in the methodological coordination was the "Train the Trainers" training, which took place in June 2024 in Poland. During this training, the structural and logical order of the course modules was formed and key didactic approaches were determined.

The course methodology combined theoretical and practical work. The theoretical methods included traditional and interactive lectures, explanations, problem-based presentations, and discussions. The practical component was implemented through seminars, practical classes, case studies, group work, business and role-playing games, training sessions, round tables and brainstorming. This approach ensured the active participation of students and the development of decision-making skills in realistic crisis scenarios.

Particular attention was paid to the use of visual and digital teaching aids, including illustrative materials, demonstrations, infographics and online platforms. The course was placed on the *TransLearnN* platform in the section 'Sustainable Development in Learning, Teaching and Research' and on the *Ukrainian-German Digital Teaching Network* (DTN) platform, which ensured the availability of materials for a wide range of participants and supported blended and distance learning.

The course methodology was tested in practice during the *TransLearnN* Spring School, which consisted of two interrelated stages: online theoretical training and an intensive face-to-face practical programme. During the face-to-face stage, there was a special focus on teamwork, interdisciplinary discussion, interaction with international experts, and analysis of real-life examples of risk management and sustainable recovery in crisis conditions.

The methodology applied and the set of educational activities provided for the achievement of the expected learning outcomes, contributed to the development of critical thinking, interdisciplinary synthesis and practical competencies of students in the field of sustainable development and risk management in crisis situations.

Figure 2: Students introducing their teams and universities

4. Description of the Course

The **aim of the course** is to make the right decisions during crises, develop sustainable scenarios for overcoming crises, understand the complex interaction of numerous crisis phenomena in order to develop the capacity (potential) to make appropriate and sustainable decisions and actions.

The subject is sustainable development and risk management in times of crisis.

Main objectives are**:**

- mastering the principles of effective decision-making during crises;
- developing skills for creating sustainable response scenarios and overcoming crisis situations;
- understanding the complex interrelationships between numerous crisis phenomena in order to strengthen the capacity for relevant and sustainable action.

Competencies:

- Ability to make reasoned decisions in crisis situations.
- Ability to adhere to sustainable development goals despite resource constraints.
- Skills to generate sustainable solutions to challenges and opportunities arising in multiple crisis situations.
- Ability to synthesise multi-approach sustainable solutions for different sectors.
- Ability to integrate administrative and managerial expertise into interdisciplinary efforts to achieve sustainable solutions.

Learning outcomes include:

- Ability to make decisions in crisis situations;
- Ability to remain on the path of sustainable development in conditions of limited resources;

- To generate sustainable solutions to overcome challenges and exploit opportunities in conditions of multiple crises;
- To synthesise sustainable multi-approach solutions for different sectors;
- To combine various administrative and management skills to support interdisciplinary synthesis of sustainable solutions.

Main topics:

1. Introduction. Definition of the concept of 'risks'. Classification of risks.
2. Environmental risk management. Risk assessment methods.
3. Environmental risks from human activity.
4. Energy risk parameters.
5. Application of a risk-oriented approach to modelling the origin and development of emergencies
6. Adaptation to climate change in crisis situations.
7. Restoration and development of Ukraine's human potential in crisis conditions.

Teaching methods:

- verbal:
  - traditional: lectures, explanations, storytelling, etc.;
  - interactive (non-traditional): problem-based lectures, discussions, etc.;
- visual: illustrations, demonstrations
- practical:
  - traditional: practical classes, seminars;
  - interactive (non-traditional): business and role-playing games, training sessions, discussion seminars, round tables, brainstorming.

The course is available on the *TransLearnN* platform in the section *Sustainable Development in Learning, Teaching and Research* under the tab *We teach / 3.*

Sustainable development and risk management in times of crisis (https://ukraine-oss.com/translearnn/). The general view of the course on the *TransLearnN* platform is shown on the Figure 3.

There is access to the course via the *Ukrainian-German Digital Teaching Network* platform (https://ukrdigital.hnee.de). The general view of the course on the DTN platform is given in Figure 4. You can access the materials without any registration as a guest using this link: https://ukrdigital.hnee.de/course/view.php?id=35.

The visualisation of the lecture material for the course 'Sustainable Pathways and Risk Management in Times of Crisis' is open access and can be found at the following link: https://dspace.khadi.kharkov.ua/handle/123456789/26974 .

Here you can find illustrations, diagrams, infographics, and other visual materials that help you better understand the theoretical concepts and practical approaches covered in the course. Excerpts from parts of the course are provided in the Appendices.

Figure 3: General view of the course on the TransLearnN platform

Figure 4: General view of the course on the DTN platform

5. Course Development

Working groups (members, format)

The course development working group includes representatives from all partner universities.

1. Vadym Burko, State Higher Education Institution «Pryazovskyi State Technical University» (Mariupol, Ukraine)

2. Angelina Chugai, Veronika Prykhodko, Odesa Mechnikov National University (Odesa State Environmental University (Odesa, Ukraine)

3. Luidmyla Herasymchuk, Zhytomyr Polytechnic State University (Zhytomyr, Ukraine)

4. Yuliia Kaliuzhna, Kharkiv National Automobile and Highway University (Kharkiv, Ukraine)

5. Serhii Kolomiiets, National Transport University (Kyiv, Ukraine)

6. Olga Litvak, Admiral Makarov National University of Shipbuilding (Mykolaiv, Ukraine)

7. Nadiia Yurkiv, Ukrainian National Forestry University (Lviv, Ukraine)

The format of the group's work consisted of regular online meetings, starting in September 2024, which initially took place once a month. Starting from 1 February 2025, the meetings were held every Tuesday from 3 p.m. to 4 p.m. The developers discussed parts of the course and presented the material they had developed.

Course development process

Working on the course started at the 'Train the Trainers' training, held from 24 June 2024 to 28 June 2024 in Rzeszow-Bezmiechowa, Poland.

The participants proposed a structural and logical order for teaching the course modules, which is included in the appendices.

Figure 5: Introduction of the proposed development process and templates by the KhNAHU team

Figure 6: Impressions from the Spring School (laboratory tour, certificates, meeting the rector)

Piloting at the Spring School

The spring school consisted of two logically connected stages:

Stage 1 (24–28 March 2025, online) – students were introduced to the theoretical foundations of the course through online lectures, which laid the groundwork for further practical work.

The stage 2 (7-12 April 2025, face-to-face in Liberec) is an intensive practical course programme entitled 'Sustainable pathways and risk management in times of crises' at the Technical University of Liberec campus in the Czech Republic.

The *TransLearnN* Spring School aims to develop practical skills for decision-making in crisis situations and understanding the complex interaction of multiple crises in order to develop the capability for relevant and sustainable decision-making and action. The main goal of the course is to teach future specialists to effectively manage risks and develop sustainable solutions to overcome challenges and opportunities in times of multiple crises.

Fourteen students, seven lecturers-developers and three stakeholder experts from Ukraine, Poland and the Czech Republic took part in the programme. The course was developed by representatives of various Ukrainian universities partnering in the project. Experts from NTU (Ukraine), Rzeszów University of Technology (Poland) and the Technical University of Liberec (Czech Republic) also joined the programme.

The event was organised by the *Technical University of Liberec* under the supervision of project supervisor Katarzyna Łoś. The event was officially opened by the dean of the Faculty of Mechanical Engineering of the Technical University of Liberec, and the three guest lecturers from the Technical University of Liberec ensured the high scientific level of the programme.

The main task of the school was to develop students' competencies in the following areas:

- Public administration - training future public officials to manage effectively in crisis situations;
- Economic sectors - training representatives of various sectors of the economy;
- Civic activism - developing the skills of public figures.

Learning outcomes included:

- Ability to make decisions in crisis situations
- Ability to remain on the pathway to sustainable development in conditions of limited resources
- Generating sustainable solutions to overcome challenges and make use of opportunities in times of multiple crises
- Synthesis of sustainable multi-approach solutions for different sectors
- Combining different administrative and management skills to support interdisciplinary synthesis of sustainable solutions.

The **programme** included:

- Daily practical classes with different teams from Ukrainian universities
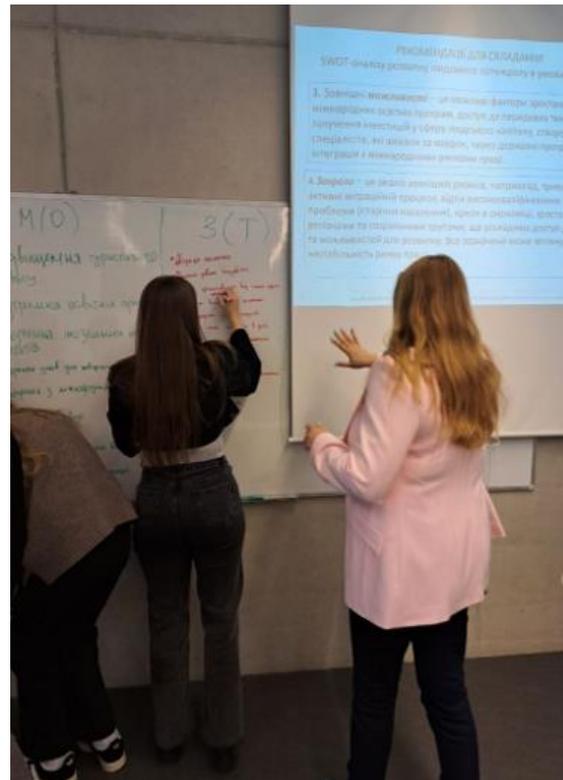
Figure 7: Impressions from the Spring School (during group work)

- Presentations and exchange of experience between Ukrainian and European universities
- Lectures by experts from the Technical University of Liberec and partner institutions
- Excursions to university laboratories with state-of-the-art equipment from Skoda and Volkswagen
- Introduction to innovative practices of Czech colleagues.

In addition to the intensive training programme, participants had a unique opportunity to explore the cultural heritage of the Czech Republic: students visited the famous European historical city of Prague, where they learned about the ancient history of the city, visited the city library and Prague University. This trip allowed participants to deepen their understanding of European educational traditions and cultural context. Participants also learned about the history of the city of Liberec and its role in sustainable urban development as part of the NetZeroCities project, which added a practical dimension to their theoretical knowledge of sustainable development. A thematic excursion to an industrial enterprise allowed participants to see the practical application of the principles of sustainable production and risk management in real conditions.

After completing the course, participants received:

- Additional competencies in risk management and decision-making in crisis situations;
- The certificate of informal education within an international programme (2 ECTS credits);
- The opportunity to transfer credits when studying educational programmes at their universities;
- Experience of international mobility at one of the best technical universities in the Czech Republic.

The final presentation of the learning outcomes and discussion of opportunities for improving the course took place on the last day of the programme, which confirmed the high quality and practical value of the knowledge gained.

Feedback (reviews) from students and experts

As part of the evaluation of the course 'Sustainable Pathways and Risk Management in Times of Crisis' expert feedback was received from representatives of scientific institutions, professional organisations and practitioners in the field of sustainable development and environmental management. Overall, the course received a positive assessment as being practically oriented and containing real tools for risk management in the implementation of business models.

Roman Symonenko, Deputy Head of the Centre for Scientific Research on Complex Transport Problems at DerzhavtotransNDIproekt, noted that the course is interesting and useful in terms of the practical methods it offers for overcoming risks during the implementation and operation of business models. The combination of theoretical approaches with practical tasks is considered to be particularly valuable.

Lyudmyla Tsyganok, the founder of ESG Liga and the president of the Professional Association of Environmentalists of the World, emphasised the importance of using cross-sectoral examples in teaching. In her opinion,

integrating case studies from economics, ecology, the energy sector, management, and urban development will help students from different fields to better understand the material and increase the practical value of the course.

Recommendations by experts

Experts provided some suggestions aimed at improving the effectiveness of the educational process:

Increasing the time allocated for preparation for practical work.

Roman Symonenko recommended giving students more time to prepare when performing practical tasks involving the simulation of an 'environmental court.' It is also important to provide students with the opportunity to independently or consultatively familiarise themselves with the relevant sections of environmental law. This would enable students to perform the roles of officials more realistically and suggest professionally sound solutions.

Expanding the practical basis of lectures.

Lyudmyla Tsyganok emphasised the advisability of using examples from various areas of social and economic development. This approach would make the course more
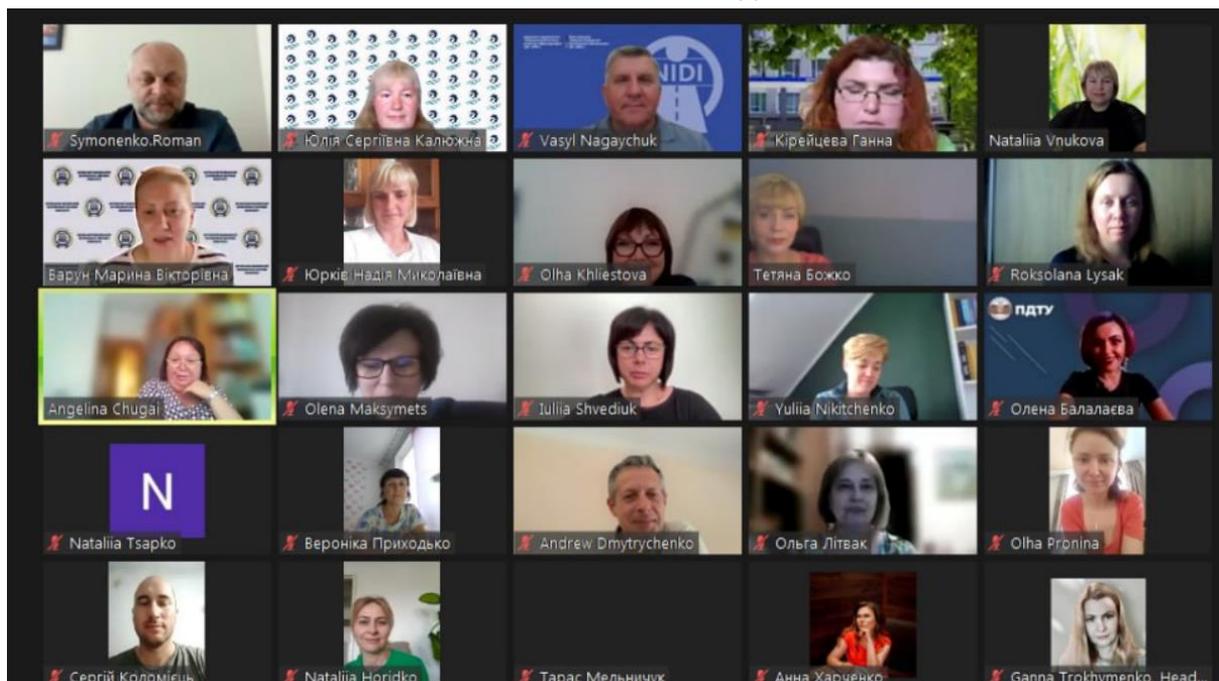

Figure 8: Meeting with non-academic experts

understandable, practical and adapted to the needs of a multidisciplinary audience.

The feedback received confirms the relevance and practical significance of Course 3. Experts highly appreciated its focus on real challenges of risk management and sustainable development. The recommendations proposed mainly concern the improvement of the practical component of the course, in particular, deepening the preparation for role-playing simulations and expanding interdisciplinary examples in the lecture material.

Feedback by Students

In order to evaluate the quality and content of the course 'Sustainable Pathways and Risk Management in Times of Crisis', a survey of students was conducted on the Moodle platform. Feedback from participants was collected through an online survey posted on the learning platform at the following link: https://ukrdigital.hnee.de/course/view.php?id=35. This made it possible to obtain a general assessment of the course, as well as suggestions for its further improvement. Students generally evaluated the course positively, noting its clear structure, logical organization, and the practical value of the knowledge they gained. Many participants noted that the course content was relevant, useful and presented in an accessible manner, and also allowed them to gain new competencies in risk management and related topics. Some students pointed out that the course was their first introduction to key concepts and approaches, making it useful for those who are new to the subject.

At the same time, participants suggested that the practical component of the course should be strengthened. In particular, there were proposals to provide more real-life examples, practical cases and tasks that would illustrate the application of theoretical approaches in real situations. Some students noted that the time for practical classes was insufficient.

As for the format and intensity of the course, students' opinions varied: some felt that the course was well balanced, while others felt that the course should be longer and that more time should be allocated for in-depth study of the material. Some respondents also suggested making the course more interactive and engaging, with more active participation of students in the learning process.

In terms of suggestions for expanding the course content, students particularly emphasised practical case studies of international experience, including examples of post-war reconstruction, as well as case studies on ecology and risk management in crisis situations. Many respondents suggested addressing the current challenges facing Ukraine.

Overall, the feedback indicates a high level of appreciation and interest in the course, which emphasises its significance in the professional development of participants, while also outlining specific areas for further improvement.

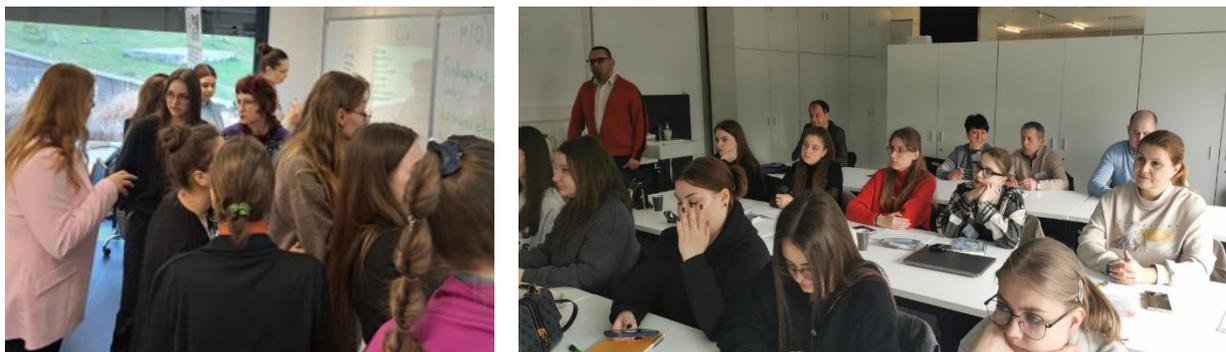An extract of the most relevant survey answers can be found in the annex 4.

Figure 9: Impressions from the Spring School (group work and in the classroom)

6. Integration of the Course into the Academic Programmes of Partner Universities

As part of the *TransLearnN* project, one of the key results was the introduction of the developed courses into the educational programmes of partner universities to ensure their sustainable use after the project completion. The course 'Sustainable Pathways and Risk Management in Times of Crisis' (SPandRM) was integrated into the educational process of higher education institutions in Ukraine as an elective or compulsory discipline, as well as a component of informal education with the possibility of credit transfer.

At *Kharkiv National Automobile and Highway University*, 16 first-year (bachelor's) students majoring in E2 Ecology began studying the SPandRM course in the spring semester of the 2025/2026 academic year. The course is available on the university's distance learning platform (https://dl2022.khadi-kh.com/course/view.php?id=6318), and is also included in the catalogue of elective courses with the corresponding syllabus (https://lnk.ua/MVwJ0Pnez).

At the *Ukrainian National Forestry University* (Lviv), the course has been implemented on the university's digital platform (https://ukrdigital.hnee.de/course/view.php?id=35). Nineteen students majoring in 073 Management, 075 Marketing, and 071 Accounting and Taxation enrolled in the course as part of their elective training. The course syllabi are available on an open access basis via a google drive folder following this link:

https://drive.google.com/drive/folders/1LUerRQpSoYReFPp6zBhrgDcza0SERfy6

At *Zhytomyr Polytechnic State University*, 18 students in their third and fourth years of study in the fields of 101 Ecology and 183 Environmental Protection Technologies (bachelor's level) took the course. The course was credited as informal education in the discipline 'European Integration in the Field of

Environmental Protection.' Information about the implementation of the course is published on the university's official website (https://news.ztu.edu.ua/2025/03/vykladachi-universytetu-sered-rozrobnykiv-kursu-sustainable-pathways-and-risk-management-in-times-of-crises-pershoyi-vesnyanoyi-shkoly-tul/). Students noted the thoroughness of knowledge on risk management in crisis situations, the clear structure of theoretical materials, and the particular usefulness of practical exercises during the face-to-face part of the course in Liberec.

At *Odessa Mechnikov National University*, the course has been integrated into the educational programme for the E2 Ecology and Environmental Protection specialisation as a compulsory discipline at the master's level (https://onu.edu.ua/pub/bank/userfiles/files/fges/spec-ta-osvit-prog/osvitni-programy/e2/opp-e2-ecologya-ohorona-ns-magistr-25.pdf). Educational materials and syllabi are also available through the Faculty's resource (https://onu.edu.ua/uk/structure/faculty/fges/navchalni-materialy-fges).

At the *Pryazovskyi State Technical University* (Mariupol), the course has been included in the catalogue of elective disciplines for the 2025–2026 academic year. It was taken by two bachelor's students enrolled in educational programmes 144 'Thermal Power Engineering' and 183 'Environmental Protection Technologies'. One of the reviews emphasised that the course helped future thermal power engineers understand how to ensure the sustainability of technical systems and minimise environmental risks in the context of energy challenges. The course materials are presented in the university's internal catalogue (3y-catalogue for bachelor's students for the 2025–2026 academic year, Google Drive).

At the *National Transport University* (Kyiv), the course is available on the distance learning platform (https://do.ntu.edu.ua/course/view.php?id=1128) and successfully completed by 10 students (6 full-time and 4 part-time). Participants positively assessed the practical focus of the course, its relevance to environmental transport management and its usefulness for writing master's theses. The interdisciplinary nature and focus on European approaches to sustainable development were mentioned as important advantages. The course syllabus has been included in the list of elective disciplines at the university (http://vstup.ntu.edu.ua/vybir-univer-mizhnarodni_proekty.pdf).

At *Admiral Makarov National University of Shipbuilding* (Mykolaiv), the SPandRM course has been integrated as an elective discipline and is available on the Moodle platform (https://moodle.nuos.edu.ua/course/view.php?id=214). The course syllabus is published in the catalogue of elective disciplines (https://nuos.edu.ua/wp-content/uploads/2025/01/VK-1_Stali-shlyahi-ta-upravlinnya-rizikami-pid-chas-kriz-1-Olga-Litvak.pdf).

Thus, the integration of the course into the educational programmes of partner universities demonstrates the successful achievement of the project's goals to modernise environmental and management education in line with the standards of the European Higher Education Area. The course has been implemented at bachelor's and master's levels, in the format of elective and compulsory disciplines, as well as a component of informal education. The first results of the pilot testing confirm its high practical value, interdisciplinarity and relevance for training specialists capable of acting effectively in crisis situations and post-war reconstruction.

Data on the integration of the course '*Sustainable Pathways and Risk Management in Times of Crisis*' into the educational programmes of partner universities is presented in Table 2 in the appendix.

Figure 10: In the classroom during the Spring School

7. Conclusions & Recommendations

Based on the results obtained, it can be concluded that the course 'Sustainable Pathways and Risk Management in Times of Crisis' successfully serves its function as an innovative educational product of the *TransLearnN* project and demonstrates significant potential for sustainable implementation in the Ukrainian higher education system. Its integration into the educational programmes of partner universities confirms the relevance of risk management, sustainable development and post-war reconstruction, which are key challenges for Ukraine and the European educational space.

The results obtained indicate a high level of interest among students of various fields of study, including ecology, management, marketing, thermal power engineering, and environmental protection technologies. This demonstrates the interdisciplinary nature of the course and its ability to develop the universal competencies necessary for working in conditions of multiple crises. It is particularly important that the course is taught not only as an elective discipline but also as a compulsory component of educational programmes (for example, at Odessa National University) and is recognised as an element of informal education with credit transfer, which is in line with the principles of the European Qualifications Framework and Erasmus+ approaches.

Positive feedback from students confirms the practical value of the course. Students note the structured nature of the materials, the relevance of environmental and social aspects of risk management, and the usefulness of practical classes and the international component, in particular the face-to-face part of the programme in Liberec. This demonstrates the effectiveness of blended learning, which combines online theory and intensive practical training.

At the same time, the results of piloting and implementation allow us to formulate a number of recommendations for the further development of the course and strengthening its impact within the objectives of the *TransLearnN* project.

First, it is advisable to expand the practical component of the course through a greater number of case studies, simulations and scenario exercises related to real-life processes of post-war reconstruction, environmental risk management and crisis decision-making at the local level. This would further enhance the

Figure 11: V. Khrutba introducing the TransLearnN project to the participants.

practical orientation of the course and improve graduates' readiness for professional activity.

Second, it is important to ensure further integration of the course into the educational programmes of partner universities with the possibility of expanding it to other specialisations and levels of education. In particular, the course could become a valuable component of programmes in public administration, engineering, economics and urban studies.

Third, it is recommended to increase the involvement of external stakeholders — municipalities, businesses, and non-governmental organizations — in teaching and assessing practical tasks. This approach will be consistent with the principles of education focused on the needs of society and will increase confidence in learning outcomes.

Fourth, it is worth continuing to develop the digital component of the course, ensuring its accessibility through partner university platforms, creating interactive materials, and supporting student and teacher communities for the exchange of experience.

Overall, the obtained results confirm that the course is an important achievement of the *TransLearnN* project and contributes to the modernisation of Ukrainian higher education in line with European standards. Its implementation forms the basis for training a new generation of specialists capable of developing sustainable solutions, managing risks and supporting Ukraine's recovery processes in the context of contemporary crisis challenges.

Appendix

Appendix 1 - Excerpts from lectures

Transformational Learning Network for Resilience

Enabling Ukrainian higher education to ensure a sustainable
and robust reconstruction of (post-war) Ukraine

Lecture

*APPLICATION OF RISK-BASED APPROACH FOR
BUILDING MODELS OF EMERGENCIES AND THEIR
DEVELOPMENT*

Kolomiiets Serhii, PhD,
Associate Professor,
Department of Ecology
and Environmental
Protection
Technologies

Lesia Kriukovska, PhD,
Associate Professor,
Department of Ecology
and Environmental
Protection
Technologies

Transformational Learning Network for Resilience

Enabling Ukrainian higher education to ensure a sustainable
and robust reconstruction of (post-war) Ukraine

Адаптація до зміни клімату в умовах кризових ситуацій

Активація Windows

Appendix 2 - Structural and logical sequence of teaching modules

Table 1: Structural and logical sequence of teaching modules in the discipline «Sustainable pathways and risk management in times of crises»

1	Ukrainian National Forestry University	Introduction. Definition of the concept of "risks". Classification of risks. / Вступ. Визначення поняття "ризики". Класифікація ризиків Risk management of sustainable development in conditions of uncertainty / Управління ризиками сталого розвитку в умовах невизначеності
2	Zhytomyr Polytechnic State University	Environmental risk management / Управління екологічними ризиками
3	Odesa Mechnikov National University	Environmental risks from technogenic activities / Екологічні ризики від техногенної діяльності
4	State Higher Education Institution «Pryazovskyi State Technical University»	Energy parameters of risks / Енергетичні параметри ризиків
5	National Transport University	Application of a risk-based approach to build models of emergencies and their development / Застосування ризик-орієнтованого підходу для побудови моделей виникнення та розвитку надзвичайних ситуацій
6	Kharkiv National Automobile and Highway University	Climate change adaptation in crisis situations / Адаптація до зміни клімату в умовах кризових ситуацій
7	Admiral Makarov National University of Shipbuilding	Restoration and development of Ukraine's human potential in the context of the crisis / Відновлення та розвиток людського потенціалу України в умовах кризи.

Appendix 3 – Integration into partner university programmes

Table 2: Integration of the course into the educational programmes of partner universities

University Name	Link to course	Links to syllabi	Number of students and feedback if available
Kharkiv National Automobile and Highway University	https://dl2022.khadi-kh.com/course/view.php?id=6318	https://lnk.ua/MVwJ0Pnez	Sixteen students of the first (bachelor's) level of higher education in the specialty 101 Ecology began studying the course this spring semester.
Ukrainian National Forestry University	https://ukrdigital.hnee.de/course/view.php?id=35	https://drive.google.com/drive/folders/1LUerRQpSoYReFPp6zBhrgDcza0SERfy6	19 registered students on the digital platform for this course, specialties 073 Management, 075 Marketing, 071 Accounting and Taxation
Zhytomyr Polytechnic State University	https://news.ztu.edu.ua/2025/03/vykladachi-universytetu-sered-rozrobnykiv-kursu-sustainable-pathways-and-risk-management-in-times-of-crises-pershoyi-vesnyanoyi-shkoly-tul/		The course was taken by 18 students in their third or fourth year of study in the bachelor's degree programmes 101 'Ecology' and 183 'Environmental Protection Technologies'. The course was credited as informal education in the discipline 'European Integration in the Field of Environmental Protection.' Feedback: The course provided in-depth knowledge of risk management in crisis situations, especially environmental and social aspects. The theoretical materials were clearly structured and relevant to contemporary challenges. The practical exercises during the face-to-face part in Liberec were particularly useful — they helped to understand how to apply risk assessment methods in real situations.
Odesa I.I. Mechnikov National University	https://onu.edu.ua/pub/bank/userfiles/files/fges/spec-ta-osvit-prog/osvitni-programy/e2/opp-e2-ecologya-ohorona-ns-magistr-25.pdf mandatory	https://onu.edu.ua/uk/structure/faculty/fges/navchalni-materialy-fges	

University Name	Link to course	Links to syllabi	Number of students and feedback if available
State Higher Education Institution «Pryazovskyi State Technical University»	Зу-каталог бакалаври 2025-2026 н.р..pdf - Google Диск TransLearnN - ДВНЗ «ПДТУ»	Зу-каталог бакалаври 2025-2026 н.р..pdf - Google Диск	2 bachelor students of Educational program 144 "Heat Power Engineering" and 183 "Environmental Protection Technologies" "The course helped me, as a future heat and power engineer, understand how to ensure the sustainability of technical systems and minimize environmental risks in the face of real energy challenges".
National Transport University	https://do.ntu.edu.ua/course/view.php?id=1128	http://vstup.ntu.edu.ua/vybir-univer-mizhnarodni_proekty.pdf	Six full-time students and four part-time students successfully completed the course. Participants noted its practical focus, relevance to environmental transport management, and usefulness for writing master's theses. They positively assessed the combination of theory with the analysis of real cases and international experience, as well as the opportunity to work with modern environmental management tools. They regarded the interdisciplinarity of the course and its focus on European approaches to sustainable development as important advantages.
Admiral Makarov National University of Shipbuilding	https://moodle.nuos.edu.ua/course/view.php?id=214	https://nuos.edu.ua/wp-content/uploads/2025/01/VK-1_Stali-shlyahi-ta-upravlinnya-rizikami-pid-chas-kriz-1-Olga-Litvak.pdf	

Appendix 4 – Feedback by Students

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Feedback by Students – Course 3

Extract of most relevant answers for the revision process

Which topics or discussions were you missing and would you suggest to include in the course?

General Feedback on Course Content

Overall Satisfaction

- "I am satisfied with the course program, but I would like more real-life examples for solving problems."

- "The course was very well created, so I even know what else could be added to it."

- "I had enough of everything."

- "The course was clear, and I liked everything."

- "I had enough material, it was relevant and useful for the course."

- "I am completely satisfied with all the course topics."

- "Everything was great, but there wasn't enough time for practical classes during offline lectures."

- "It was my acquaintance with risk management, and I don't know what topics to suggest."

- "I cannot leave any additional edits or complaints because I believe that everything was presented and organized in an accessible and simple way for the participants."

Time, Intensity and Format Concerns

- "I would like more time for a deeper study of the material and practical tasks."

- "I would like to add more time because the course is extensive and has many important topics, and time is very limited."

- "The intensity of the course was high, but such important topics deserve more detailed disclosure."

- "There was enough of everything on the course."

- "I would suggest including more interactivity with students, more involvement in the process of studying the material."

Demographic and Gender Sensitivity

- "I want to suggest changing the rhetoric about demography, as I was literally mad when I heard something like 'women don't want to give birth to babies.' It sounds like the first step to reproductive violence."

- "In Ukraine, sex education is not enough, and there should be more correct explanations on demography."

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Figure 12: Feedback by students related to the content (this and ff. 2 pages)

Suggestions for Additional Topics

Practical and Case Studies

- "I would suggest including more practical cases from the international experience of post-war reconstruction."

- "I would suggest adding more practical workshops on building international partnerships and examples of successful post-war business recovery cases."

- "It would be helpful to include more practical examples related to the actual application of risk management in post-war reconstruction."

- "It would be useful to introduce a section on innovative technologies in environmental protection, such as the use of artificial intelligence, big data, and automation in ecosystem monitoring."

- "Case studies of successful post-conflict environmental reconstruction."

- "More case studies from other post-conflict countries (e.g., Bosnia, Iraq) could provide comparative perspectives and practical lessons."

- "More practical case studies from Ukraine or other countries."

- "A more detailed discussion of specific adaptation strategies during crises, as well as practical case studies from the real world."

Psychosocial Support & Community Engagement

- "Psychosocial Support and Community Engagement: Given the trauma caused by war, it would be helpful to include strategies for providing psychosocial support to affected populations."

- "Psychological aspects of environmental risk perception. How communities experiencing conflict process environmental risks differently."

- "Psychological resilience and community engagement in post-crisis recovery, focusing on how to support affected populations mentally and socially."

- "Psychological resilience and stress management in crisis and post-crisis recovery."

Post-War Recovery Focus

- "Post-war recovery models and community-led reconstruction efforts."

- "Reconstruction after war, especially environmental recovery after conflicts, including how to restore ecosystems and fight pollution."

- "This course lacks up-to-date information for Ukrainian specialists, such as risks related to the ongoing war, pollution caused by military actions, and potential methods for addressing these issues."

Environmental Topics

- "Post-war environmental restoration – More focus on how to restore ecosystems and landscapes damaged by war."

- "I would suggest adding a module about how climate change increases the frequency and intensity of emergencies."

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- "Post-war recovery: the role of innovation and green technologies in sustainable rebuilding, highlighting modern approaches to infrastructure and energy systems that align with environmental and climate goals."

- "Environmental education and communication – properly conveying environmental ideas to a wide audience."

- "One topic I was missing is climate change adaptation strategies, particularly focusing on how businesses and communities can proactively adjust to climate impacts."

- "It would be useful to consider environmental recovery after conflicts, including how to restore ecosystems and fight pollution in the affected regions, which is important for the reconstruction of Ukraine."

- "Climate adaptation strategies, particularly how to implement them in Ukraine."

Legal and Policy Frameworks
- "A deeper focus on legal frameworks and policy-making in reconstruction processes would be useful, especially for those working in government or administration."

- "One topic I was missing is community engagement in crisis recovery – how to actively involve local communities in sustainable rebuilding efforts."

Risk Management, Digital Tools and Technologies
- "The role of digital tools in risk management, such as data analysis platforms, geographic information systems (GIS), and predictive modeling."

- "Digital tools for risk assessment and management. Coverage of modern software, AI applications, and remote sensing technologies that can accelerate and improve risk assessment in reconstruction contexts."

- "Information risk management and countering disinformation in crisis situations."

- "I would suggest including a section on the use of technology for risk management in crisis situations."

- "Risk management and risk assessment methodologies."

International Cooperation and Financing
- "International Collaboration and Coordination: How Ukraine can engage with international organizations, governments, and NGOs in the reconstruction process."

- "Financial mechanisms for green reconstruction. Exploration of innovative funding models, green bonds, and international climate finance opportunities relevant to Ukraine's context."

Other Suggested Topics
- "More information about alternative paths in the economy. For example, in the energy sector, machine building, and alternative mining."

- "Disposal of ammunition after military actions."

- "The assessment of risks associated with the loss of political stability is interesting."

3

Feedback by Students – Course 3

Extract of most relevant answers for the revision process

How could the overall structure and the formats of the course be improved?

Practical Application and Hands-on Learning

Practical Tasks and Case Studies

- More real-life case studies and simulations related to international marketing and post-war economic recovery.

- Include hands-on activities like role-playing, case study analysis, or simulations to apply risk management theories to real-world challenges.

- Incorporate role-playing exercises or simulations (e.g., energy grid restoration during a crisis, post-war recovery).

- Add more practical exercises where students work on projects for real companies or NGOs.

- Introduce scenario-based exercises that simulate real-world challenges for better understanding of complex systems (e.g., environmental recovery after war).

- Partner with Ukrainian municipalities to co-develop course materials and have students analyze ongoing recovery projects, providing actionable recommendations and tracking outcomes.

- Introduce virtual field visits to post-war or reconstructed areas for deeper context.

Interactive Workshops and Group Work

- Increase opportunities for group discussions, collaborative group work, and peer-to-peer feedback.

- Encourage more group projects focused on designing environmental risk assessments or proposing sustainability strategies.

- Add more group discussions with teachers and peers, where participants can apply the concepts to real-life scenarios.

- Increase hands-on, interactive workshops or simulations to practice decision-making and teamwork in real-world crisis scenarios.

- Encourage peer-to-peer review sessions for knowledge exchange and reflection.

- Include more live discussions, real-time webinars, or Q&A sessions with instructors and guest speakers.

- Use online discussion forums for peer interaction and feedback.

- Use rotating small-group debates on localized risks (e.g., rural vs. urban recovery), encouraging adaptive strategies and diverse perspectives.

Simulations and Role-Playing

- Incorporate role-playing games, such as simulating crisis management or recovery processes.

- Use virtual or physical simulations to engage students in dynamic problem-solving.

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Figure 13: Feedback by students related to the format (this and ff. 2 pages)

- Introduce intensive 2-week modules (e.g., simulating energy grid restoration) to replace some passive lectures with real-time problem-solving.

Guest Speakers and Expert Panels

- Introduce expert speakers or webinars where professionals from the field can discuss current trends, challenges, and real-world experiences.

- Host live expert panels or virtual lectures to gain insights into the practical application of course material.

Content Delivery Enhancements

Shorter, Focused Content

- Reduce the length of lectures and focus on key points for better engagement.

- Implement short, concise video lessons or animated explainers for easier digestion of complex material.

Visual and Interactive Learning Tools

- Add more infographics, interactive diagrams, and data visualization tools to help students understand complex concepts.

- Use visual aids like charts, maps, and videos to explain topics like environmental monitoring and risk analysis.

General Course Organisation

Communication and Digital Learning

- Improve communication between students and teachers regarding group work and lecture details.

- Develop an accessible online platform with supplementary materials for flexible learning beyond formal sessions.

- Implement more online meetings with video and photo materials to enhance the learning experience.

- Use digital platforms to facilitate clearer communication and ensure students are well-informed throughout the course.

Translation and Language Support

- Allow tests and materials in native languages for better accessibility.

Interactive Tests and Assessments

- Develop more engaging assessments, such as quizzes, case-based questions, or decision-making scenarios.

- Replace traditional exams with portfolio assessments like creating risk mitigation blueprints tailored to specific regions or scenarios.

Adjust Pace and Time Allocation

- Allow more time for practical classes, and adjust the pace of work to ensure that students can fully grasp the material.

- Allocate more time for collaborative group discussions, which were particularly useful in applying theory to practice.

- Consider shorter modules or focused sessions to prevent overwhelming participants with excessive information at once.

Summary of Key Improvements:

- **More Interactive Formats**: Increase simulations, role-playing, case studies, and group discussions.

- **Guest Speakers and Expert Panels**: Bring real-world insights through webinars, expert panels, and practitioner experiences.

- **Practical Application**: Add more hands-on tasks and projects, particularly related to post-war recovery and environmental risks.

- **Content Delivery**: Focus on shorter, more digestible video lessons, enhanced with visual aids and interactive learning tools.

- **Assessments**: Introduce portfolio-based assessments and peer reviews to focus on practical outcomes.

- **Course Flexibility**: Offer more flexibility in content delivery, including digital learning and native language options.

- **Pacing and Time Management**: Adjust course pace and allocate more time for practical and collaborative tasks.

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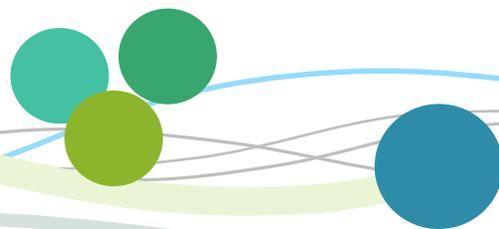
Let's build a resilient and sustainable
future together!