

TARAS SHEVCHENKO NATIONAL UNIVERSITY OF KYIV

INSTITUTE OF GEOLOGY

Department: **Petroleum Geology**

«APPROVE»
Deputy Dean on academic study
Astr. Prof. Pasko V.F.

«27» August 2025

WORK PROGRAMME OF THE DISCIPLINE
Hazardous Natural-Anthropogenic Processes and Engineering of Environment

for student

Branch of knowledge C Social Sciences, Journalism Information and International Relations
Training direction (Specialty) C6 Geography and Regional Studies
Educational level *master*
Educational program «Transboundary cooperation» environmental
Type of discipline *Mandatory*

Teaching mode *full-time studies*
Academic year/ навчальний рік 2025/2026
Semester/ семестр 2
Number of credits ECTS 3
Language of teaching, *English*
Learning and evaluation
Form of control *Test*

Lecturer: *BAYSAROVYCH Iryna, PhD in Geology, Associate professor, Department of Petroleum Geology*

To be continued
for 20__/20__ (_____) «__» 20__
for 20__/20__ (_____) «__» 20__

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Kyiv – 2025

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APPROVED

«26» August 2025

Chief of the Chair of Physic Geography and Geoecology



As. Prof. Bilous L.F.

Protocol No 1 dated «26» August 2025

Approved by geographic faculty academic-methodological commission

Protocol No7 dated «27» August 2025

Chief of the academic-methodological commission _____ As. Prof. Korohoda
N.P.



«27» August 2025

1. **The purpose of the discipline** is to familiarize students with the basic concepts of the risk of occurrence, course and prevalence of dangerous natural-anthropogenic processes, analysis of the causes of hazardous processes and modern research methods; familiarization with the existing technical measures to prevent destructive consequences and recommendations for adaptation to life in areas with the development of certain dangerous processes, as well as the main ways of minimizing the negative consequences of natural-anthropogenic processes. The main aspects of environmental engineering are considered, the range of problems that are solved in connection with climate changes, in particular with pollution of the atmosphere and hydrosphere, solid waste management, rational management of water resources

2. Advance claims to mastering or selection of the academic discipline:

1. Basic knowledge of Geomorphology, the basics of Geology, Meteorology, Geodesy and Cartography, Hydrology, Engineering Geology
2. The level of English proficiency not lower than B1. /

3. Annotation of the academic discipline: Academic discipline "Hazardous natural-anthropogenic processes and Engineering of environment" is part of education and professional training program for the education level "master" branch of knowledge *10 Natural Sciences*", educational program – *"Transboundary environmental cooperation"*.

The course examines the hazardous natural-anthropogenic processes caused by action of endogenous and exogenous factors and enhanced by human activity. Special attention is paid to the monitoring system, prevention measures and minimization of risk consequences.

This discipline is mandatory for the educational program "Transboundary environmental cooperation". The discipline is taught in the 2nd semester of 1st year Master's degree program in volume - 90 hours (3 credits ECTS) including lectures - 14 hours, seminars - 14 hours, self-study work - 62 hours. The course content provides two modules and two module tests. The discipline is finished by Test

4. The tasks of the discipline

1. To acquaint students with:
 - the fundamental principles of the basic concept on the development of hazardous natural and natural-anthropogenic processes;
 - the main methodological approaches to risk analysis in the study of the areas of distribution and frequency of development of hazardous processes;
 - modern ideas about the intensification of hazardous natural processes as a result of climate change;
 - the concept of environmental engineering;
 - basics of solid, liquid and gaseous waste management
2. To develop students' ability to identify and describe the main risks associated with natural hazards (for example, landslides, seismic and hydrological processes) in the international context.

The achievement of the stated educational goals will facilitate the acquisition of the following general competences by students:

- Ability to identify, formulate, and solve the problems ((general competencies) GC3)
- Ability to communicate in a foreign language. (GC6)
- Ability to independently determine relevant aspects in fundamental and applied areas of natural and socio-geographic research, to acquire new knowledge using modern educational and research technologies ((special competencies) SC10).

5. Results of academic discipline study/ Результати навчання за дисципліною:

Learning results (1. to know; 2. be able to; 3. communication; 4. autonomy and responsibility)		Methods of teaching and learning	Assessment methods	Percentage in the final assessment of the discipline
1.1	Fundamental principles of the basic concept for the development of hazardous natural processes	lecture	test paper	5%
1.2	Methodology of Risk analysis. Types of data used to implement the analysis and basic equation	Lecture, seminar	test paper/ report	10%
1.3	The main ways of organizing monitoring systems and preventing the development of hazardous natural and anthropogenic processes in a certain territory	Lecture, seminar	Presentation/ report	5%
1.4	The main risks of the manifestation of dangerous processes in connection with climatic changes	Lecture, seminar	test paper	10%
1.5	The subject area of environmental engineering	Lecture, seminar	test paper	5%
1.6	Basics of solid, liquid and gaseous waste management	Lecture, seminar	Presentation/ report	10%
2.1	Identify and describe the main risks associated with landslide processes	Lecture, seminar	Presentation/ report	5%
2.2	Identify and describe the main risks associated with seismic processes	Lecture, seminar	Presentation/ report	5%
2.3	Identify and describe the main risks associated with hydrological processes	Lecture, seminar	Presentation/ report	5%

3. 1	Ability to communicate in a foreign language (English).	<i>Seminar</i>	<i>report</i>	35%
4. 1	To act socially responsible and consciously in the international working group.	<i>seminar</i>	<i>Report, final test</i>	5%

6. The correlation of the learning outcomes of the discipline with the program results / Співвідношення результатів навчання дисципліни із програмними результатами навчання

Learning outcomes of the discipline	1.1	1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3	3.1	4.1
Program learning outcomes											
PRN03. Communicate fluently on professional and scientific issues in a foreign language. /ІІPH03.	+	+	+	+	+	+				+	
PRN04. Conduct research and/or carry out innovative activities to acquire new knowledge, develop new methods and procedures in geography and interdisciplinary contexts, including those related to environmental protection, landscape restoration and conservation, and biodiversity. /ІІPH04.							+	+	+		+
PRN08. Conduct research on natural and socio-geographical manifestations of geosystems development in complex and unpredictable conditions, predict their development, analyze alternatives, assess risks and possible consequences ІІPH08.		+	+	+		+	+	+	+		+
PRN11. Assess possible risks, socio-economic and geo-environmental consequences of implementing management decisions in the field of natural resources management, environmental protection, urban and					+	+	+	+	+		+

regional development, recreation and tourism ІІРН11.											
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7. Scheme of grade formation:

The level of achievement of all planned results of study is determined by the results of oral answers and writing control tests.

The share of study results in the final grade, provided that it is mastered at the appropriate level is as follows:

- results of study – **1 (knowledge)** – up to 45%;
- results of study – **2 (skills)** – up to 15%;
- results of study – **3 (communication)** – up to 35%;
- results of study – **4 (autonomy and responsibility)** – up to 5%

7.1. Forms of students' evaluation:

The discipline consists of two content parts. Studies are conducted as lectures and seminars. During semester, after proper themes completing, *two tests* are carried out.

Evaluation by forms of testing:

	<i>First content part</i>		<i>Second content part</i>	
	<i>Min. – 15 points</i>	<i>Max. – 30 points</i>	<i>Min. – 15 points</i>	<i>Max. – 30 points</i>
Implementation of assignment	„1” x 9 = 9	„2” x 9 = 18	„1” x 9 = 9	„2” x 9 = 18
test No 1	„6” x 1 = 6	„12” x 1 = 12		
test No 2			„6” x 1 = 6	„12” x 1 = 12
„3” – minimal/maximal point which can be get by student. 1 – test quantity of assignments or tasks				

Results of students' academic study are evaluated by 100-point scale. Students who got point quantity, which is lesser than *critical-calculating minimum (30 points)*, have to pass modular test for the second time in order to allow them to take the examination. Maximal final test grade is *40 points*.

	First content part	Second content part	Final test	Final grade
<i>Minimum</i>	15	15	30	60
Maximum	30	30	40	100

In general, the formation of the evaluation is based on the "Regulations on the organization of the educational process at the Taras Shevchenko National University of Kyiv", enacted by Order № 170-32 of April 11, 2022.

7.2. Organizing of evaluation:

Evaluation is carried out during semester for all kinds of students' studies including their self-ruling studies.

Grades-points' correspondence scale

<i>100-point scale</i>	<i>Grade of the national scale</i>
60-100	<i>Passed</i>
1-59	<i>No passed</i>

7.2. Організація оцінювання:

Оцінювання здійснюється впродовж семестру усіх видів робіт, включаючи і самостійну роботу.

Шкала відповідності оцінок-балів

<i>100-бальна шкала</i>	<i>Оцінка за національною шкалою</i>
60-100	<i>Зараховано</i>
1-59	<i>Не зараховано</i>

STRUCTURE OF THE DISCIPLINE PLAN OF LECTURES AND SEMINARS

#	Theme	Hours		
		Lectures	Seminars	Self – studying work
<i>1 Hazardous natural-anthropogenic processes; methodology of studying and evaluation, prevention and mitigation actions</i>				
1	Theme 1. Introduction to Natural Hazards. Risk analysis methodology	1		5
2	Theme 2 Landslides. Geographic regions at risk from landslides. Identification of potential landslides. Engineering and construction measures aimed at minimizing the consequences	2	2	8
3	Theme 3. Earthquake destructiveness. Building Code. Liquefaction phenomenon. Induced seismicity.	2	2	8
4	Theme 4. Flooding. Floodplain regulation. Effects of Urbanization on s the flood hazard of an area.	2	3	10
	<i>Test 1</i>			
<i>2. Engineering of environment vs Climate change</i>				

5	Theme 5. Introduction to Engineering of environment. The impact of climate change on the activation of hazardous processes	2		5
6	Theme 6. Management of solid waste.	2	2	8
7	Theme 7. Water supply. Management of water waste	2	3	10
8	Theme 8. Air pollution Management	1	2	8
	<i>Test 2</i>			
	Total	14	14	62

Total hours of the discipline – 90, that include:

Lectures – **14 hrs**

Seminars - **14 hrs**

Self-studying work - **62 hrs**

RECOMMENDED LITERATURE

Basic:

1. Gordon D. Understanding Unconventional Oil // Energy and Climate, 2012. - P. 1-25.
2. “Incorporating Induced Seismicity in the 2014 United States National Seismic Hazard Model—Results of 2014 Workshop and Sensitivity Studies.”
3. Natural hazards: earth’s processes as hazards, disasters, and catastrophes/ Edward A. Keller, Robert H. Blodgett. Pearson Education Inc., -2nd ed. 2008. - 488 p.
4. Paul Hawken Regeneration. Ending the climate crises in one generation. New York: Penguin Books, 2021
5. *Press Frank, Silver Raymond.* Understanding Earth. – New York. W. H. Freeman and Company, Second ed., 1998. – 682 p.
6. Seismicity & induced earthquakes. Gary Gibson & Prof. Mike Sandiford Melbourne Energy Institute University of Melbourne.2013
7. *The IPCC’s Fifth Assessment Report (AR5) 2013*
8. *The IPCC’s Six Assessment Report (AR6) 2023*
9. *Understanding Earth. Second Edition. Harvard University. W.H. Freeman and Company.* New York. 1998. - 682 p.

Additional:

1. Горбань І.В., Байсарович І.М., Вижва С.А. Екологія водних ресурсів та природних систем: Навч. посібник. –К.: ВГЛ ”Обрії”, 2003. –35 с.
2. Won-Young Kim. Induced seismicity associated with fluid injection into a deep well in Youngstown, Ohio// Journal of Geophysical Research: Solid Earth - 2013. Vol 118 Issue7.