


**НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ БІОРЕСУРСІВ І
ПРИРОДОКОРИСТУВАННЯ УКРАЇНИ**

Кафедра екології агросфери та екологічного контролю


“ЗАТВЕРДЖУЮ”
Декан факультету
Ю.В. Коломієць
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“СХВАЛЕНО”
на засіданні кафедри
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Протокол № 7 від « 15 » травня 2024
Завідувач кафедри
 О.І.Наумовська

“РОЗГЛЯНУТО”
Гарант ОП 101 «Екологія»
 Боголюбов В.М.

**РОБОЧА ПРОГРАМА
НАВЧАЛЬНОЇ ДИСЦИПЛІНИ**

ЕКОЛОГІЧНІ РИЗИКИ «Environmental Risks»

Галуз знань - 10 Природничі науки
Спеціальність 101 Екологія
Освітня програма – Екологія
Факультет захисту рослин , біотехнологій та екології
Розробник: доцент, к.п.н Строкаль В.П.,
кафедра екології агросфери та екологічного контролю

Київ-2024

1. Course description

Environmental Risks

Educational level, specialization and program		
Education level	Bachelor	
Specialization	101 Ecology	
Educational program	Ecology	
General characteristics		
Type	Compulsory	
Total hours	120	
ECTS credits	4	
Total number of modules	2	
Course project	Absent	
Assessment type	exam	
Indicators for the full-time and part-time types of education		
	Full-time	Part-time
Year	1	
Semester	2	
Lectures (hours)	30	
Practicals (hours)	30	
Laboratory work	-	
Self-study (hours)	60	
Contact hours per week	4	

2. Course aim, objectives and competences

This course is part of the Bachelor specialization within the educational program “Ecology”.

The main aim of the course is to provide Bachelor students with knowledge about environmental risks in the world and their associated drivers and impacts.

The main course objectives are (1) to discuss the environmental risks in relation to natural disasters, climate change, pollution (air, soil and water), human activities and biodiversity loss; (2) to identify the most relevant environmental risks in a specific continent in the world and their drivers and impacts; (3) design a flowchart that shows the most relevant interactions between drivers and impacts for the environmental risk of a continent.

The main pre-requisite to take this course is that the students follow the following two disciplines: “Introduction to the Specialization”, and “The Basis of the Environmental Education and Culture”.

This course serves as the basis to take the next disciplines such as “General Ecology”, “Environmental safety” and “Landscape ecology”.

Набуття компетентностей:

Інтегральна компетентність (ІК): здатність розв’язувати складні спеціалізовані задачі та вирішувати практичні проблеми у сфері екології, охорони довкілля і збалансованого природокористування, що передбачає застосування основних теорій та методів наук про довкілля, які характеризуються комплексністю та невизначеністю умов.

Загальні компетентності (ЗК):

ЗК03. Здатність до адаптації та дії в новій ситуації.

ЗК08. Здатність проведення досліджень на відповідному рівні.

Фахові (спеціальні) компетентності (ФК):

ФК08. Здатність обґрунтовувати необхідність та розробляти заходи, спрямовані на збереження ландшафтно-біологічного.

ФК12. Здатність до опанування міжнародного та вітчизняного досвіду вирішення

регіональних та транскордонних екологічних проблем.

Програмні результати навчання (ПРН):

ПРН04. Використовувати принципи управління, на яких базується система екологічної безпеки.

ПРН09. Брати участь у розробці та реалізації проєктів, направлених на оптимальне управління та поводження з виробничими та муніципальними відходами.

ПРН15. Уміти пояснювати соціальні, економічні та політичні наслідки впровадження екологічних проєктів.

3. Program and structure of the course for:

- full-time (part-time) education

Names of modules and topics	Hours												
	Full-time education							Part-time education					
	weeks	total	Including					total	Including				
			Le	P	Lab	Ind.	Self-study		Le	P	Lab	Ind.	Self-study
Module 1. Theoretical principles of environmental risks and their classifications													
Topic 1. Definition of environmental risks	1	10	2	2			6						
Topic 2. Principles of environmental risks	2	10	2	2			6						
Topic 3. Classifications of environmental risks	3	10	2	2			6						
Total for module 1		30	6	6			18						
Module 2. Environmental risks, their types and interactions													
Topic 4. Natural disasters	4	10	2	2			6						
Topic 5. Climate change	5-6	14	4	4			6						
Topic 6. Pollution	6-8	18	6	6			6						
Topic 7. Biodiversity loss	9-10	14	4	4			6						
Topic 8. Human activities	11-12	14	4	4			6						
Topic 9. Interactions and overall impacts	12-13	10	2	2			6						
Topic 10: Methodology for quantifying environmental risks	14-15	10	2	2			6						
Total for module 2		90	24	24			42						
Total for the course		120	30	30			60						

4. Topics of seminars

№	Topic	Hours
1	The course does not include seminars	
2		
...		

5. Topics of the practicals

№	Topic	Hours
Module 1. Theoretical principles of environmental risks and their classifications		
1	Definition of environmental risks: students will learn several definitions of the environmental risk by solving a puzzle, reviewing relevant literature and summarizing the outcome of that review in a poster	2
2	Principles of environmental risks: students will be asked to study principles of the environmental risks by discussing the principles from the provided literature and summarizing the outcome of that discussion on a slide that students will present	2
3	Classifications of environmental risks: the classifications of the risks will be provided to the students. This classification will be the basis for module 2. Students will study that classification via brainstorming with their partner and summarizing the outcome of that brainstorm on a slide.	2
Module 2. Environmental risks, their types and interactions		
4	Natural disasters: students will form small groups and select one natural disaster that will be studied in more depth. Assignments will be given to identify the causes and effects of that selected disaster via a two-slide presentation	2
5	Climate change: students in their groups (formed in Topic 4, see above) will be asked to map the most recent climate change disasters that have happened in the world over the past 5 years. For each group, a continent will be assigned to study and identify which climate change events happened (e.g., droughts, floods, heatwaves) and where in the continents over the past 5 years. Each group will form their answers in the form of two slides.	4
6	Pollution: students will continue working in their groups and on the same continent. In this topic, the focus will be on air, water and soil pollution of that continent. Students will study relevant literature and identify the most pollution problems (e.g, either water, soil or air or combinations of several). Students will summarize their outcomes in the form of two slides.	6
7	Biodiversity loss: students will continue working in the same group and on the same continents as was assigned in the previous topics. Here, an assignment will be to identify which biodiversity species are most vulnerable to their loss due to climate change impacts (based on their outcome on Topic 5) and pollution (based on their outcome on Topic 6). Results will be presented in two slides.	4
8	Human activities: Students continue working in the same group and on the same continent. Here, they build on the outcomes from Topics 1-7 and analyse the most dominant human activities in their continent. Students will be asked to link those human activities to the impacts of pollution and climate change (e.g., how those activities contribute to climate change? And to pollution?). Answers to those questions will be summarized on two slides.	4

9	Interactions and overall impacts: students will be asked to reflect back on the outcomes of their group work that they performed on Topics 4-8. Students will revise their slides from the previous assignments. They will identify the main environmental risk in their continent and form a flowchart that can show the most relevant interactions between drivers and impacts for the environmental risk. Thus, the flowchart should include drivers of that risk (e.g., human activities from Topic 8), the status of the environment (e.g., pollution levels from Topic 6), impacts (e.g., biodiversity loss from Topic 7, natural disasters from Topic 4) and responses to the environmental risk (new assignment).	2
10	Methodology for quantifying environmental risks: Here, students will be given examples of simple methodologies to address the environmental risks including modeling and indicators. Students will discuss those examples and draw lessons on the applicability of those methodologies for their environmental risk (see Topic 9).	2
	Total	30

6. Laboratory topics

№	Topic	Hours
1	The course does not include laboratory work	
2		
...		

7. Examples of exam questions to test whether students achieved the learning outcomes of the course

1. *What is Environmental Risk Assessment?*

A) Is the process of assessing potential risks posed by human activities and natural processes to ecosystems, species, and habitats.

B) Is the process of understanding potential risks posed by human activities and natural processes to ecosystems, species, and habitats.

C) Is the type of environmental assessment that allows to observation of risks.

2. *The first step in this process of conducting an environmental risk assessment include:*

A) Five key reasons

B) Four key reasons

C) Two key reasons

3. *Which type of environmental risk includes dangerous chemicals that can contaminate air, water, or soil, leading to serious health consequences when these pollutants are ingested or inhaled?*

A) Chemical hazards

B) Physical hazards

C) Biological hazards

D) Habitat destruction

4. *Which type of environmental risk comprises biological agents like bacteria, viruses, and fungi that can cause illness or disease when people contact them?*

A) Chemical hazards

B) Physical hazards

C) Biological hazards

D) Habitat destruction

5. *Which type of environmental risk has significant consequences for plants and animals that rely on these environments for survival?*

A) Chemical hazards

- B) Physical hazards
- C) Biological hazards
- D) Habitat destruction

6. *What are the main consequences of deforestation? (choose several answers)*

A) Biodiversity loss is among the most pressing issues, as many species lose their natural habitats, pushing them closer to extinction.

B) Destruction of forests contributes significantly to greenhouse gas emissions, further exacerbating climate change

C) Stark more frequent extreme weather events, and disruptions to ecosystems and agriculture.

7. *What are the main consequences of Agricultural Practices and Soil Degradation? (choose several answers)*

A) Soil quality diminishes, impacting crop productivity and the overall health of ecosystems

B) Excessive use of chemical fertilizers and pesticides leads to water pollution, causing harmful effects on aquatic life and posing risks to human health.

C) Stark more frequent extreme weather events, and disruptions to ecosystems and agriculture.

8. *What are the main consequences of Climate Change? (choose several answers)*

A) A warming planet.

B) Rising temperatures result in melting ice caps, leading to sea-level rise and threatening coastal communities

C) Extreme weather events, such as hurricanes, droughts, and heat waves, become more frequent and severe, causing widespread devastation

9. *To combine types of environmental risk with their implications.*

<i>Types of environmental risk</i>		<i>Implications</i>	
A	Natural disasters	1	Earthquakes, floods, landslides, wildfires, hurricanes, tsunamis
B	Climate change	2	Global warming, rising sea levels, ocean acidification, extreme weather events
C	Pollution	3	Air pollution, water pollution, soil contamination
D	Biodiversity loss	4	Habitat destruction, invasive species, overexploitation
E	Human activities	5	Deforestation, mining, agriculture urbanization

10. *What is a carbon footprint?*

A) Carbon footprint is a concept used to quantify the impact of an activity, a person or a country on climate change

B) Carbon footprint is a process that can unquantified the impact of an activity, a person, or a country on climate change

C) Carbon footprint is a way that can understand the impact of the environment

8. Methods

1. *Differentiated instruction:* provide books and articles on different environmental risks; host small groups to provide discussion to students; offer one-on-one after-taught help to students encountering challenges.

2. *Lecture-based learning:* explain information while students observe; lead a lesson by presenting on, showing visuals of, and making examples of the environmental risks. Here are some ways that teachers ensure the success of lecture-based learning: keep lessons brief and understandable, allow time for questions at the end of the lesson, create instructional videos or explanations of lectures and practicals, promote handwritten notes (hand-writing notes on paper are a superb way to stay focused during lectures, it also helps students to recall information well and strengthen their spelling and writing skills).

3. *Group learning*: segmenting students into groups is a great way to teach them skills in collaboration; while in their teams, they can discuss subjects of environmental risks and learn about the perspectives of others; it's important to encourage both class participation and listening skills so that students can gain these abilities for the future; group work are exciting opportunities for students.

4. *Individual learning*: this educational method allows students to work by itself and is an excellent way to give students time to think through topics and develop thoughts and analyses; this is especially helpful before hosting a class discussion so class members can have ideas for what to say.

5. *Game-based learning*: this educational method is used to strengthen the knowledge and skills of students via puzzles, crosswords, and interactive games using platforms such as <https://learningapps.org/myapps.php>, https://padlet.com/dashboard?mobile_page=AccountsMenu, <https://wordwall.net/myactivities>, <https://create.kahoot.it/my-library/kahoots/73d729bc-80f7-4284-b91d-b02031330da4>.

Combining and using all these five types of teaching methods in lectures and practicals can benefit the educational process by teaching your students effectively, supporting well-functioning lessons and practical activities, and finding the best ways to connect with your students.

9. Forms of examination and knowledge testing

Types and forms of control are regulated by the Regulations on Examinations and Tests at the National University of Life and Environmental Sciences of Ukraine https://nubip.edu.ua/sites/default/files/u284/polozh_ekzameni_zaliki_2020_dlya_saytu.pdf

1. Oral and written current knowledge control.
2. The form of independent work of the applicant is the study of special literature and the implementation of individual tasks.
3. Examination.

Types of knowledge control of higher education students are current control, intermediate and final certification. Current control is carried out during practical classes and is aimed at checking the level of readiness of higher education students to perform specific work.

10. Distribution of points received by students

Student knowledge is assessed on a 100-point scale and converted to national grades according to Table 1 "Regulations on Exams and Tests at NUBiP of Ukraine" (order on implementation of 26.04.2023, protocol No. 10).

Points	Assessment	
	Exam	Test
90-100	Excellent	Pass
74-89	Good	
60-73	Satisfactory	
0-59	Unsatisfactory	Fail

11. Literature supporting the course:

1. Екологічна безпека: підручник / В.М. Шмандій, М.О. Клименко, Ю.С. Голік, А.М. Прищеп, В.С. Бахарев, О.В. Харламова. Херсон : Олді-Плюс, 2019. 366 с.
2. Забезпечення екологічної безпеки: підручник / М.В. Сарапіна, В.А. Андронов, С.Р. Артем'єв, О.В. Бригада, О.В. Рибалова. Харків : НУЦЗУ, 2019. 246 с.
3. Екологічна безпека інженерної діяльності: підручник / Ю. В. Носачова, О. І. Іваненко, В. В. Вембер. Київ : Кондор, 2020. 212 с.

4. Войціцький, В. М., Хижняк, С. В., Данчук, В. В., Мідик, С. В., Гришук, І. А., & Ушкалов, В. О. (2020). Екологічні ризики: природа і критерії. Заступник головного редактора: Нагорнева НА, 131. URL: <http://ecoj.dea.kiev.ua/archives/2020/4/23.pdf>
5. Палапа, Н. В., & Гончар, С. М. (2022). Екологічні ризики, пов'язані із сільськогосподарською діяльністю людини. Агроекологічний журнал, (1), 68-80. <https://doi.org/10.33730/2077-4893.1.2022.255189>
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7. Topping, C. J., Aldrich, A., & Berny, P. (2020). Overhaul environmental risk assessment for pesticides. *Science*, 367(6476), 360-363. DOI: 10.1126/science.aay1144 / URL: https://www.science.org/doi/full/10.1126/science.aay1144?casa_token=WUGR9z0kkoAAAAA%3AgAKRb7Lw3jsmeoQulFyIMtSOU3ZznydT5S01Dn9Wny_IT0dJJlTPDNS69iKsRFikIIQCaYE3tceckus
8. Paul, B. K. *Environmental Hazards and Disasters: Contexts, Perspectives and Management*: book. *John Wiley & Sons*. 55 p. URL: https://books.google.com.ua/books?hl=uk&lr=&id=F7i4KeOUe3cC&oi=fnd&pg=PT9&dq=type+of+environmental+hazards&ots=nuJVHtRWdN&sig=4c0J6Z4Z0_K443WC8vR2aeINfWk&redir_esc=y#v=onepage&q=type%20of%20environmental%20hazards&f=false
9. Вплив російської агресії на стан природних ресурсів України : монографія / В. П. Строкаль [та ін.]. Київ : Видавничий центр НУБіП України, 2023. 222 с. URL: <https://dglb.nubip.edu.ua/handle/123456789/10632>
10. Макаренко Н.А., Строкаль В.П., Бережняк Є.М. та інші (2022). Вплив російської воєнної агресії на природні ресурси України: аналіз ситуації, методологія оцінювання. Наукові доповіді НУБіП України, (4 (98)). URL: <http://journals.nubip.edu.ua/index.php/Dopovidi/article/view/16137>