

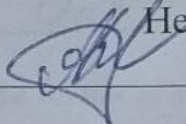
to the Order of March 23, 2023 № 244

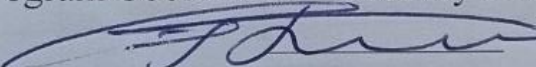
**NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF  
UKRAINE**

Department of General Ecology, Radiobiology and Safety of Life Activity

**"CONFIRMED"**  
Dean of the Faculty of Land Management  
Taras IEVSIUKOV  
\_\_\_\_\_ 2023 p.

**"APPROVED"**  
at the meeting of the department of General Ecology,  
Radiobiology and Safety of Life Activity  
Protocol №9 dated "19" 04. 2023 p.

  
Head of Department  
Alla KLEPKO

**"REVIEWED"**  
Program Coordinator "Geodesy and Land Management"  
 Ivan KOVALCHUK

**PROGRAM OF THE COURSE**

«General Ecology»

Specialization 193 Geodesy and Land Management  
Educational program "Geodesy and land management"  
Faculty (Institute) Faculty of Land Management  
Developers: docent PhD on agrarian sciences Rakoid O.O.,  
(position, academic degree, academic title)

## 1. Description of the course

### General Ecology

(title)

<b>Field of knowledge, specialization, educational program, educational degree</b>		
Educational degree	<i>Bachelor's</i>	
Specialization	<i>193 Geodesy and Land Management</i>	
Educational program	<i>"Geodesy and land management"</i>	
<b>Characteristics of the course</b>		
Type	elective	
Total number of hours	120	
Number of ECTS credits	4	
Number of content modules	2	
Course project (work) (if applicable)		
Form of assessment	<i>Credit</i>	
<b>Indicators of the course for full-time and part-time forms of study</b>		
	Full-time form of study	Part-time form of study
Course (year of study)	1	
Semester	2	
Lecture classes	<i>15 hr.</i>	<i>hr.</i>
Practical, seminar classes	<i>15 hr.</i>	<i>hr.</i>
Laboratory classes	<i>hr.</i>	<i>hr.</i>
Self-study	<i>90 hr.</i>	<i>hr.</i>
Individual assignments	<i>hr.</i>	<i>hr.</i>
Number of weekly classroom hours for the full-time form of study	<i>2 hr.</i>	

## 2. Purpose, objectives, and competencies of the course

*Purpose* of study are to expand the objects, methods and place of the discipline in the system of environmental knowledge; to learn basic concepts, principles and laws of ecology; to know the evolution of the relationship between human and environment and structure of the environment; to understand the relationship between living organisms in the biosphere and opportunities of their sustainable development; to introduce the causes, extent, signs and ways of solutions of the global environmental crisis; to promote ecological view of the world for future professional activity.

*Objectives* of discipline is formation the theoretical knowledge on goals, targets and value of ecology as well as practical skills on the problems of different components of the environment (surface and ground water, oceans and seas, atmospheric air, soils etc.); estimation of possible anthropogenic impact on the environment, especially on land and soil; prediction of changes in the state of environment as well as working out

the scientifically-grounded recommendations for realization of nature protection measures.

**Acquisition of competencies:**

Integrated competency (IC):

The ability to solve complex specialized problems of geodesy and land management.

General competencies (GC):

GC01. Ability to learn and master modern knowledge.

GC02. Ability to apply knowledge in practical situations.

GC04. Ability to communicate in the national language both orally and in writing.

GC13. The ability to preserve, multiply moral, cultural, scientific values and achievements of society based on an understanding of history, patterns of development of the subject area, its place in the general system of knowledge about nature and society, as well as in the development of society, techniques and technologies, to use different types and forms of physical activity for recreation and a healthy lifestyle.

Professional (special) competencies (PC):

PC01. Ability to apply fundamental knowledge for the analysis of phenomena of natural and man-made origin in the performance of professional tasks in the field of geodesy and land management.

PC02. Ability to apply theories, principles, methods of physical and mathematical, natural, socio-economic, engineering sciences in performing tasks of geodesy and land management.

PC08. Ability to carry out professional activities in the field of geodesy and land management, taking into account the requirements of professional and civil safety, labour protection, social, environmental, ethical, economic aspects.

**Program learning outcomes (PLO):**

PLO5. To apply conceptual knowledge of natural and socio-economic sciences in the performance of tasks of geodesy and land surveying.

**3. Program and structure of the course for:**

– complete full-time (part-time) form of study

Names of content modules and topics	Number of hours													
	Full-time form							Part-time form						
	weeks	total	including					total	including					
			1	p	l a b	in d	sel f		1	p	lab	in d	sel f	
2	3	4	5	6	7	8	9	10	11	12	13	14		
Content Module 1. General provisions of ecology. Ecosystem approach in ecological study														
Topic 1. Basic concepts and definitions of ecology as a science	1-2	15	2	2			11							
Topic 2. The concept of the biosphere.	3-4	15	2	2			11							

Components of the environment													
Topic 3. Ecological factors. Interaction between biological systems and the environment	5-6	15	2	2			11						
Topic 4. Structure and principles of ecosystem functioning	7-8	15	2	2			11						
Total for content module 1	60		8	8			44						
<b>Content Module 2. Practical aspects of ecology</b>													
Topic 1. Ecosystem dynamics and resilience	9-10	16	2	2			12						
Topic 2. Environmental issues of the current state of system "Nature–Society"	11-12	18	2	2			14						
Topic 3. Human impacts on the planet. Achieving environmental sustainability	13-15	26	3	3			20						
Total for content module 2		60	7	7			46						
Total hours		120	15	15			90						
Course project (work) on _____ (if included in the curriculum)			-	-	-		-		-	-	-		-
Total hours		120	15	15			90						

#### 4. Seminar topics

№	Topic title	Number of hours
1		
2		
...		

#### 5. Practical class topics

№	Topic title	Number of hours
1	Links of ecology with other natural disciplines. Stages of formation of ecology as a science	2
2	Basic laws of ecology. Laws-axioms of B. Commoner	2
3	The impact of abiotic environmental factors on living	2

	organisms. Biotic factors and interactions in ecosystems	
4	The study of trophic relationships in an ecosystem. Practical application of the rule of the ecological pyramid and the law of bioaccumulation (concentration)	2
5	Consequences of the impact of human activity on natural systems at the global level	2
6	Problems of ensuring environmental sustainability in Ukraine by the example of the "small motherland"	2
7	Problems of sustainable environmental management. Principles of sustainable production and consumption. Calculation of the individual ecological footprint	3

## 6. Laboratory class topics

№	Topic title	Number of hours
1		
2		
...		

## 7. Independent work topics

№	Topic title	Number of hours
1	The main directions of modern ecological research. Contribution of Ukrainian scientists to the development of ecology	11
2	Biosphere as a global ecosystem. The cycle of matters in the biosphere as a requirement for its sustainability	11
3	Basic environmental laws, principles and rules. Principles of ecological classification of organisms	11
4	The impact of natural and anthropogenic environmental factors on the stability of biota	11
5	Impact of human activities on natural systems. Environmental basics of nature protection	12
6	Land and soil degradation processes. National policy in the sphere of protection of land resources	16
7	Problems of ensuring sustainable nature management in Ukraine	20

## 8. Samples of control questions, tests for assessing the level of knowledge acquisition by students.

1. Give the definition of ecology as science.
2. Who is often considered a "father of ecology"? Why?
3. When the word "ecology" is of recent origin was firstly proposed?
4. What are the ecological levels of organization?
5. What was the contribution of V. Vernadsky in the development of ecology?
6. What kind of modified by human activities ecosystems do you know?

7. What does autecology deal with?
8. Name the major zones of the Atmosphere from lowest to highest layer.
9. Give the definition of the biosphere.
10. Fill the gap in the sentence: "The contemporary life and its activities are the product of a long and complex evolution of the ...".
11. The distribution of water in the Hydrosphere
12. What do you mean by "tolerance range" of species?
13. What kind of species will tend to be widely distributed?
14. Key types of species interactions.
15. According to Odum, "the ecological niche of an organism depends not only on where it lives but also on what it ..." (fill in omitted word).
16. Construct a food chain that contains four organisms.
17. Types of ecological pyramids.
18. Is the human activity the primary driver of recent global warming?
19. What are the two air pollutants that most significantly affect human health?
20. Limiting factors may be ... (name them)
21. Trophic structure of ecosystems:
22. What kinds of primary productivity do you know?
23. What does primary productivity depend on?
24. Fill the gap in the sentence: "Green plants, the primary producers of a terrestrial ecosystem, generally capture about ... of the energy that falls on their leaves converting it to food energy".
25. What role do plants play in the water cycle? What role do they play in the carbon cycle?
26. Has land degradation accelerated or slowed down during the 20th century?
27. Classification of soil degradation processes.
28. What global trends are expected to dramatically increase pressure on the land?
29. When the concept of land degradation neutrality was first introduced?
30. What is the new paradigm in land stewardship?

Samples of tests to determine the level of knowledge acquired by students

НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ БІОРЕСУРСІВ І ПРИРОДОКОРИСТУВАННЯ УКРАЇНИ			
ОС «Бакалавр» Напрямок підготовки/ спеціальність <u>193 Geodesy and Land Management</u>	Кафедра Загальної екології, радіобіології та безпеки життєдіяльності 2023-2024 навч. рік	ЕКЗАМЕНАЦІЙНИЙ БІЛЕТ № 1  з дисципліни <b>General Ecology</b>	Затверджую Зав. кафедри  _____ (підпис) А.В. Клепко _____ 2023 р.
<i>Екзаменаційні запитання</i>			
1. What are the major branches of ecology? What do they deal with?			
2. Describe the key types of species interactions. Give some examples of mutualism and commensalism.			
<i>Тестові завдання різних типів</i>			
1. Ecological units:			
1. Organism	A	a group of organisms which can interbreed and successfully produce offsprings	
2. Species	B	all populations of the different species occupying a particular area at a given time	
3. Population	C	a phenotypic representation of the genotype that is directly influenced by environment	
4. Community	D	all similar organisms, belonging to the same species, living at one place at any given time	
2. Temperature influences the rates of biochemical reactions in plants			

1. Yes	2. No
3. <i>The term "ecology" having been first proposed by:</i>	
1. Eugene Odum;	
2. Ernst Haeckel;	
3. Charles Darwin;	
4. Charles Elton.	
4. <i>Species that exhibit broad ecological amplitude with respect to an aggregate of factors are called...</i>	
5. <i>The source of almost all of energy required by organisms is:</i>	
1. ultraviolet energy;	
2. thermal energy;	
3. radiant energy.	
6. <i>Trophic structure of ecosystems:</i>	
1. autotrophs	A herbivores
2. heterotrophs	B producers
	C omnivores
	D decomposers
7. <i>What kinds of primary productivity do you know?</i>	
1. gross primary productivity;	
2. gross primary production;	
3. small primary productivity;	
4. net primary productivity.	
8. <i>What is the main constituent of acid rains?</i>	
9. <i>"Growth is controlled not by the total of resources available, but by the scarcest resource" – it's the low:</i>	
1. of Limiting factors;	
2. of the Minimum;	
3. of Tolerance.	
10. <i>Types of ecological pyramids</i>	
1. an energy pyramid	A shows the total mass of organisms in each trophic level
2. a pyramid of biomass	B shows the number of individuals of all populations in each trophic level
3. a pyramid of numbers	C illustrates energy loss and transfer between trophic levels

## 9. Teaching methods.

When studying the discipline, the following methods of teaching are used:

Depending on the source of knowledge: verbal (explanation, conversation, discussion, dialogue); visual (demonstration, illustration); practical (problem solving, business games).

By the type of cognitive activity: explanatory-visual problematic presentation, partly search and research methods.

By place in learning activities:

- methods of organization and implementation of learning activities, combining verbal, visual and practical methods; reproductive and problem-solving; methods of learning work under the guidance of a teacher and methods of independent work of higher education applicants;

- methods of control and self-control of learning activities: methods of oral and written control; individual and frontal, thematic and systematic control.

In the process of teaching the academic discipline to intensify the educational and cognitive activity of applicants for higher education the use of such educational technologies is provided:

- work in small groups allows to structure practical seminars in form and content, creates opportunities for participation of each applicant for higher education in the work on the topic of the class, provides the formation of personal qualities and experience of social communication;

- seminars-discussions involve the exchange of opinions and views of the participants about the topic, as well as develop thinking, help to form views and beliefs, the ability to formulate thoughts and express them, learn to evaluate the proposals of others, and critically think about their own views;

- brainstorming as a method of solving urgent problems, the essence of which is to express as many ideas as possible in a limited amount of time, to discuss and carry out their selection;

- case method - a method of case studies, which allows to bring the learning process closer to the real practical activity of specialists and involves the consideration of production, management and other situations, complex conflict cases, problem situations, incidents in the study of educational material;

- presentations - speeches to an audience, which are used to present certain achievements, group results, report on the performance of individual tasks, instruction, and demonstrations.

## **10. Forms of assessment**

In accordance with the Regulations on the examinations and credits at the National University of Life and Environmental Sciences of Ukraine, approved by the Academic Council of NUBiP Ukraine on April 26, 2023, Protocol № 10, the types of knowledge control of higher education are the current control, intermediate and final attestation.

Current control of the discipline is carried out during the practical purposes, and aims to test the level of preparedness of applicants for higher education to perform specific work.

Intermediate attestation is held after the study of program material and should determine the level of knowledge of applicants for higher education in the program material obtained in all types of classes and independent work.

The form of the intermediate attestation is testing.

The mastering of the program material by a higher education applicant is considered successful if his rating score is at least 60 points on a 100-point scale.

Semester certification is held in the form of semester credit.

Applicants for higher education are required to take exams and credits in accordance with the requirements of the working curriculum in the time provided by the schedule of the educational process. The content of credit is determined by the working training program of the discipline.

### **Distribution of grades received by students.**

Evaluation of student knowledge is carried out on a 100-point scale and is converted to national grades according to Table 1 "Regulations and Examinations and Credits at NULES of Ukraine" (order of implementation dated 26.04.2023, protocol №10).

<b>Student rating, points</b>	<b>National grade based on exam results</b>	
	<b>Exams</b>	<b>Credits</b>
<b>90-100</b>	<b>Excellent</b>	<b>Passed</b>
<b>74-89</b>	<b>Good</b>	



<b>60-73</b>	<b>Satisfactory</b>	
<b>0-59</b>	<b>Unsatisfactory</b>	<b>Not passed</b>

In order to determine the rating of a student (listener) in the discipline  $R_{dis}$  (up to 100 points), the rating from the exam  $R_{ex}$  (up to 30 points) is added to the rating of a student's academic work  $R_{aw}$  (up to 70 points):  $R_{dis} = R_{aw} + R_{ex}$ .

### 11. Educational and methodological support.

1. Закон України «Про охорону навколишнього природного середовища» від 25 червня 1991 року № 1264-ХІІ.

2. Закон України «Основні засади (стратегія) державної екологічної політики України на період до 2030 року» від 28.02.2019 № № 2697-VIII.

3. Положення про державну систему моніторингу довкілля. Затверджено Постановою Кабінету Міністрів України від 30 березня 1998 р., № 391. Київ, 1998. – 7 с.

4. Указ Президент України “Про Цілі сталого розвитку України на період до 2030 року” від 30 вересня 2019 року № 722/2019.

5. Національна доповідь “Цілі сталого розвитку: Україна”. – Міністерство економічного розвитку і торгівлі України, 2017. – 176 с.

6. Екологія. Навчально-методичний посібник для самостійного вивчення дисципліни / За ред. В.М. Боголюбова. – К.: НАУ. – 2006. – 156 с.

7. Rakoid O.O. Basics of Ecology. Study guide for students with direction 193 Geodesy and Land Management. – К.: Компрінт, 2016. – 240 с.

8. Rakoid O.O. Basics of Ecology. Study guide for students with direction 193 Geodesy and Land Management. – Kyiv: NUBiP, 2019. – 160 p.

9. Rakoid O.O. Basics of Ecology. Study guide for EQL Bachelor with specialty 193 Geodesy and Land Management. Second edition. – Kyiv: NUBIP, 2021. – 227 p.

10. Основи екології / За ред. М’ягченко О.П. – К.: Центр учбової літератури, 2010. – 307 с.

11. C.J. Barrow. Environmental Management for Sustainable Development. Second Edition. – Taylor & Francis e-Library, 2006. – 465 p.

12. Соломенко Л.І., Боголюбов В.М. Загальна екологія. Навчальний посібник. – Херсон: ОЛДІ-ПЛЮС, 2014. – 294 с.

13. Odum, E.P. 1993. Ecology and Our Endangered Life-Support Systems. Sinauer Associates, Inc. Sunderland, MA.

14. Transforming our world: the 2030 Agenda for Sustainable Development. – [Електронний ресурс]. – Режим доступу: <https://sustainabledevelopment.un.org/post2015/transformingourworld>

15. Екосистемні послуги. Огляд. Укладачі: Олексій Василюк, Любов Львівська, 2020 р. – [Електронний ресурс]: [https://uncg.org.ua/wp-content/uploads/2020/09/EcoPosluga\\_web\\_new.pdf](https://uncg.org.ua/wp-content/uploads/2020/09/EcoPosluga_web_new.pdf)

### 12. Recommended sources of information

1. Environmental databanks of the Information Analytical Center of the Ministry of the Environment and Natural Resources: [www.ecobank.org.ua](http://www.ecobank.org.ua)

2. Information and analytical data base “Environmental passport of the regions of Ukraine”: <http://ukrecopass.org.ua/>
3. Bulletin “State of Ground Waters of Ukraine”: <http://www.geoinf.kiev.ua/>
4. Bulletin “Annual Bulletin on the State of Rivers of Ukraine”: <http://www.cgo.kiev.ua/>
5. Climatic cadastral register of Ukraine: <http://www.cgo.kiev.ua/>
6. Environment and Ecology: <http://environment-ecology.com/>
7. The United Nations Convention to Combat Desertification/ Knowledge Hub. <https://knowledge.unccd.int/>
8. Офіційний сайт Міністерства захисту довкілля та природних ресурсів України: <http://www.menr.gov.ua>
9. WWF Footprint Calculator <https://footprint.wwf.org.uk/#/>
10. ЕкоЗагроза (офіційний вебресурс і мобільний додаток Міндовкілля, завдяки якому можна дізнатись достовірну інформацію про стан повітря, води, ґрунту та інші дані) <https://ecozagroza.gov.ua/>