NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE

Department of General Ecology, Radiobiology and Safety of Life Activity

"APPROVED"

The Faculty of Plant Protection, Biotechnologies and Ecology "21" May 2025

CURRICULUM OF ACADEMIC DISCIPLINE <u>Environmental Monitoring</u>

Field of knowledge <u>10 Natural sciences</u> Specialty <u>101 Ecology</u>

Academic programme <u>"Ecology"</u>

Faculty (Education and Research Institute): <u>Faculty of Plant Protection</u>, <u>Biotechnologies</u> and Ecology

Author(s): docent Rakoid O.O., PhD on agrarian sciences

Description of the discipline Environmental Monitoring

The discipline "Environmental monitoring" in the system of environmental knowledge is one of the leading ones because it is designed to help us understand the natural environment and protect it from any negative outcomes of human activity. Environmental monitoring is a tool to assess environmental conditions and trends, support policy development and its implementation, and develop information for reporting to national policymakers, international forums and the public.

Academic degree, specialty, academic programme					
Academic degree	Bachelor				
Specialty	101 Ecology				
Academic programme	"Ecology"				
Chara	acteristics of the discipline				
Туре	0	Compulsory			
Total number of hours		150			
Number of ECTS credits		5			
Number of modules		2			
Course project (work) (if any)	c.pr				
Form of assessment	Exam				
Indicators of the discipline					
for full-time and part-time forms of university study					
	Form of obtaining higher education				
	Full-time	Part-time			
Year of study	3	-			
Semester	1	-			
Lectures	30 hours	- hours.			
Practical classes and seminars	- hours	- hours			
Laboratory classes	30 hours	- hours			
Self-study	90 hours	- hours			
Number of hours per week for full-time students	4				

1. Aim, objectives, competences and expected learning outcomes of the discipline

Aim of discipline is to expand the object, methods and place of the discipline "Environmental monitoring" in the system of environmental knowledge as well as highlight its main principles; to introduce the main sections of the discipline; to promote ecological outlook for future environmentalists.

Objectives of the discipline is formation the theoretical knowledge and practical skills in the field of environmental monitoring, in particular on the modern problems of different components of the environment (surface and ground water, oceans and seas, atmospheric air, soils etc.), estimation of impact of anthropogenic stresses on them, 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 competences:

Integral competence (IC): Ability to solve complex specialized problems and solve practical problems in the field of ecology, environmental protection environment and balanced environmental management, which involves the application of basic theories and methods of environmental sciences, characterized by complexity and uncertainty of conditions.

General competencies (GC):

GC 02. Skills in the use of information and communication technologies.

GC 06. Ability to communicate with representatives of other professional groups of different levels (with experts from other fields of knowledge/ types of economic activity).

Special (professional) competences (SC):

SC21. Ability to conduct environmental monitoring and assess the current state of the environment.

SC24. Ability to use modern information resources for environmental research.

SC27. Ability to participate in the management of environmental actions and/or environmental projects.

Expected Learning Outcomes (ELO):

ELO05. Understand the conceptual framework for monitoring and regulating anthropogenic pressure on the environment.

ELO10. Be able to apply software tools, GIS technologies and Internet resources for information support of environmental research.

ELO15. Be able to explain the social, economic and political implications of environmental projects.

	Number of hours												
Modules		full-time			part-time								
and topics	weeks	total			includin	ıg	T	total	l including			ıg	
			1	р	lab	ind	s.st		1	р	lab	ind	s.s t
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Module 1	Theore	tical an	id met	hodol	logical	aspec	ts of s	ocial e	colog	gy			
Topic 1. Basic concepts of	1-2	19	4		4		11						
Topia 2 The State	2 /	10	1		1		10						
Environmental Monitoring	5-4	10	4		4		10						
System of Ukraine		•					10						
Topic 3. Monitoring in the field of atmospheric air protection	5-6	20	4		4		12						
Topic 4. The state water monitoring	7-8	20	4		4		12						
Total for module 1	77		16		16		45						
M	odule 2.	Socio-n	atural	prog	ress a	nd the	eco-se	ociety					
Topic 1. Land and soil monitoring. Assessment of land degradation	9-10	200	4	<u> </u>	4		12						
Topic 2. Climate change and climate monitoring	11-12	20	4		4		12						
Topic 3. Monitoring of biodiversity (Biomonitoring)	13-14	19	4		4		11						
Topic 4. Global approaches for environmental monitoring	15	14	2		2		10						
Total for module 2	73		14		14		45						

2. Programme and structure of the discipline

Total hours	150	30	30		90			
Course project (work)								
(if included in the curriculum)	c.pr							
Total hours	150	30	30		90			

3. Topics of lections

N⁰	Topic title	Hours
1	Basic concepts of environmental monitoring	4
2	The State Environmental Monitoring System of Ukraine	4
3	Monitoring in the field of atmospheric air protection	4
4	The state water monitoring	4
5	Land and soil monitoring. Assessment of land degradation	4
6	Climate change and climate monitoring	4
7	Monitoring of biodiversity (Biomonitoring)	4
8	Global approaches for environmental monitoring	2

4. Topics of laboratory classes

N⁰	Topic title	Hours
1	Definitions and historical background of monitoring. Classification of	4
	monitoring system	
2	Regulatory and policy framework of SEMS	4
3	Analytical research methods of air condition	4
4	Physical and chemical parameters of water quality monitoring	4
5	Agroecological monitoring. Methods for determining the contaminant	
	concentration in soils	
6	Characteristics and uses of climate observations at the global and national	4
	levels	
7	International approaches to biomonitoring. Indicators used to conduct	4
	monitoring biodiversity at the global and national levels	
8	World experience in organizing environmental monitoring systems	2

5. Topics for self-study

N⁰	Topic title	Hours
1	Factors and indicators that are studied in environmental monitoring	11
2	Informational support of SEMS. Data base organization and management	10
3	Causes and sources of air pollution in Ukraine	12
4	Monitoring of ocean and sea water pollutants	12
5	Methodological and technical support of geoecological monitoring	12
6	The main sources of radioactive contamination. Radioecological control of	12
	soils, water and food	
7	Biodiversity monitoring programmes for endangered species	11
8	Ecological and hygienic monitoring	10

6. Tools for assessing expected learning outcomes:

- oral or written questioning;
- interview;
- testing;
- defence of laboratory/practical, calculation/graphic works, projects;
- peer assessment, self-assessment.

7. Teaching methods:

- the method of problem-based learning;
- method of practice-oriented learning;
- case method;
- method of learning through research;
- method of educational discussions and debates;
- method of teamwork, brainstorming.

8. Assessment of learning outcomes:

The assessment of students' knowledge and skills is conducted by means of a 100-point scale and is converted into national grades of the current Exam and Credit Regulations at NULES of Ukraine.

Type of learning activity	Learning outcomes	Assessment				
Module 1. Theoretical	Module 1. Theoretical and methodological aspects of social ecology					
Lecture 1 Basic concepts of environmental monitoring	To understand methods of grounding the net of observation of the components of	2				
Laboratory class 1. Definitions and	biosphere;	10				
historical background of monitoring.	To be able to ground the choice of methods					
Classification of monitoring system	and places of observation for the state of environment.	6				
are studied in environmental monitoring	To be able to search for information using	U				
	appropriate sources to make informed					
	decisions					
Lecture 2 The State Environmental	To have a knowledge about subjects, tasks	2				
Monitoring System of Ukraine	and scheme of national monitoring system;	10				
framework of SEMS	environmental monitoring system:	10				
Self-study 2. Informational support of	To understand the basic environmental laws.	6				
SEMS. Data base organization and	rules and principles of environmental	Ū				
management	protection and nature management.					
Lecture 3 Monitoring in the field of	To know programs of observation of the	2				
atmospheric air protection	pollution sources and level of pollution;	10				
Laboratory class 3. Analytical research	To demonstrate an understanding of the basic	10				
Self-study 3 Causes and sources of air	principles of environmental management	5				
pollution in Ukraine	and/or environmental projects.	5				
Lecture 4 The state water monitoring	To solve problems in the field of	2				
Laboratory class 4. Physical and	environmental protection using generally	10				
chemical parameters of water quality	accepted and / or standard approaches and					
monitoring Salf study 4 Monitoring of occur and see	To know programs of observation of the	5				
water pollutants	water pollution sources and level of pollution	5				
Module test 1.		30				
Total for Module 1		100				
Module 2. Socio	-natural progress and the eco-society					
Lecture 5 Land and soil monitoring.	To be able to predict the impact of	2				
Assessment of land degradation	technological processes and industries on the					
Laboratory class 5. Agroecological	environment;	10				

8.1. Distribution of points received by students

monitoring. Methods for determining the	To solve problems in the field of		
Self-study 5. Methodological and	accepted and/or standard approaches and	6	
technical support of geoecological	international and national experience		
monitoring			
Lecture 6 Climate change and climate		2	
monitoring	To be able to delate the results of activities to		
Laboratory class 6. Characteristics and	community of professionals and public in	10	
uses of climate observations at the global	general make presentations and messages		
and national levels	To demonstrate skills in assessing unforeseen		
Self-study 6. The main sources of	environmental problems and thoughtful	5	
radioactive contamination.	choice of ways to solve them.		
Radioecological control of soils, water			
and food			
Lecture 7 Monitoring of biodiversity		2	
(Biomonitoring)	To know the conceptual basis of monitoring		
Laboratory class 7. International	and regulation of anthropogenic pressure on	10	
approaches to biomonitoring. Indicators	the environment and biodiversity.		
used to conduct monitoring biodiversity	To be able to predict the impact of		
at the global and national levels	technological processes and industries on the	_	
Self-study /. Biodiversity monitoring	biota.	5	
programmes for endangered species			
Lecture 8 Global approaches for	To be able to ground the choice of methods	2	
environmental monitoring	and places of observation for the state of	10	
Laboratory class 8. World experience in	environment;	10	
organizing environmental monitoring	To use modern methods of analysis and		
Systems	To develop scientifically grounded	6	
self-study 8. Ecological and hygienic	recommendations for supporting of	0	
monitoring	managerial decisions in the field of		
	environmental protection		
Module test 2.			
Total for Module 2		100	
Educational work	$(M1 + M2)/2*0.7 \le 70$		
Examination	30		
Total for the course	(Academic work + exa	mination) ≤ 100	
Course project (work)		100	
(if included in the curriculum)		100	

8.2. Scale for assessing students 'knowledge and skills

Student's rating, points	National grading of exams and credits
90-100	excellent
74-89	good
60-73	satisfactorily
0-59	unsatisfactorily

8.3. Assessment policy

Deadlines and exam retaking policy:	Works that are submitted late without valid reasons will be assessed with a lower grade. Module tests may be retaken with the permission of the lecturer if there are valid reasons (e.g., a sick leave).
Academic integrity policy:	Cheating during tests and exams is prohibited (including using mobile devices). Term papers and essays must have correct references to the literature used
Attendance policy:	Attendance is compulsory. For good reasons (e.g., illness, international internship), training can take place individually (online by the faculty dean's consent)

9. Teaching and learning aids

1. Електронний навчальний курс навчальної дисципліни «Environmental Monitoring»: https://elearn.nubip.edu.ua/course/view.php?id=2246

2. Положення про державну систему моніторингу довкілля. Затверджено Постановою Кабінету Міністрів України від 30 березня 1998 р., № 391.

3. Постанова КМУ від 5 грудня 2007 р. №1376 (Із змінами, внесеними згідно з Постановою КМУ від 17.08.2011 р. № 880 (880-2011-п)) Про затвердження Державної цільової екологічної програми проведення моніторингу навколишнього природного середовища.

4. Постанова КМУ від 31.12.2004 р. № 992-р. "Про схвалення Концепції Державної програми проведення моніторингу навколишнього природного середовища".

5. Про затвердження Положення про моніторинг земель. Постанова КМУ від 20.08.1993 № 661.

6. Деякі питання здійснення державного моніторингу в галузі охорони атмосферного повітря. Постанова КМУ від 14.08.2019 № 827.

7. Про затвердження Порядку здійснення державного моніторингу вод. Постанова КМУ від 19.09.2018 № 758.

8. Rakoid O.O., Bogoliubov V.M. Environmental monitoring. Study guide. – Kyiv: NUBIP, 2019. – 301 p.

13. Моніторинг довкілля: підручник / [Боголюбов В.М., Клименко М.О., Мокін В. Б. та ін.]; за ред. проф. В.М. Боголюбова. Вид. 2-ге, переробл. і доповн. – Київ: НУБіПУ, 2018. 435 с.

14. Klepko A.V., Rakoid O.O. Methodical Guidelines for coursework on the discipline "Environmental Monitoring" for students of the educational degree "Bachelor" with specialisation 101 Ecology. Kyiv: NUBIP, 2024. 44 p.

15. Rakoid O.O., Bogoliubov V.M., Klepko A.V., Bondar V.I. Environmental monitoring. Textbook. Kyiv: NUBIP, 2023. 332 p.

10. Recommended sources of information

- 1. European Environment Agency: http://www.eea.europa.eu/
- 2. Національний портал відкритих даних: http://data.gov.ua
- 3. Громадський моніторинг стану якості повітря: https://eco-city.org.ua/
- 4. Програма Європейського Союзу Copernicus: https://www.copernicus.eu/en

5. Інтерактивна карта "Чиста вода": https://texty.org.ua/articles/86343/Chysta_voda_Interaktyvna_karta_rozpovist_pro_stan-86343/

6. Єдина екологічна платформа "ЕкоСистема": https://eco.gov.ua/

7. Офіційний сайт Міністерства захисту довкілля та природних ресурсів України: http://www.menr.gov.ua

8. ЕкоЗагроза (офіційний вебресурс і мобільний додаток Міндовкілля, завдяки якому можна дізнатись достовірну інформацію про стан повітря, води, грунту та інші дані) https://ecozagroza.gov.ua/