

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

Department of General Ecology, Radiobiology and Safety of Life Activity

"APPROVED"

Dean of the Faculty of Plant Protection,
Biotechnologies and Ecology

_____ Yulia KOLOMIETS
“ _____ ” _____ 2026

"APPROVED"

at the meeting of the Department of
General Ecology, Radiobiology and Safety of
Life Activity

Minutes № 9 of “14” May 2026
Head of the Department _____ Alla KLEPKO

"REVIEWED"

Guarantor of the AP "Ecology"

_____ Volodymyr BOGOLYUBOV

CURRICULUM OF ACADEMIC DISCIPLINE
Environmental Monitoring

Field of knowledge E ‘Natural Sciences, Mathematics and Statistics’

Specialty E2 Ecology

Academic programme "Ecology"

Faculty: Faculty of Plant Protection, Biotechnologies and Ecology

Author(s): Olena RAKOID, docent, 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	<i>Bachelor</i>	
Specialty	<i>E2 Ecology</i>	
Academic programme	<i>"Ecology"</i>	
Characteristics of the discipline		
Type	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	<i>Exam</i>	
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	<i>30 hours</i>	<i>- hours.</i>
Practical classes and seminars	<i>- hours</i>	<i>- hours</i>
Laboratory classes	<i>30 hours</i>	<i>- hours</i>
Self-study	<i>90 hours</i>	<i>- hours</i>
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.

List of courses that must be completed prior to studying 'Environmental Monitoring' (where applicable) «Foreign language», «Regulation of human impact on the environment».

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.

2. Programme and structure of the discipline

Modules and topics	Number of hours													
	full-time							part-time						
	weeks	total	including					total	including					
			l	p	lab	ind	s.st		l	p	lab	ind	s.s t	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Module 1. Theoretical and methodological aspects of social ecology														
Topic 1. Basic concepts of environmental monitoring	1-2	19	4		4		11							
Topic 2. The State Environmental Monitoring System of Ukraine	3-4	18	4		4		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							
Module 2. Socio-natural progress and the eco-society														
Topic 1. Land and soil monitoring. Assessment of land degradation	9-10	200	4		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						
Total hours	150	30	30			90						
Course project (work) <small>(if included in the curriculum)</small>	c.pr											
Total hours	150	30	30			90						

3. Topics of lectures

№	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

№	Topic title	Hours
1	Definitions and historical background of monitoring. Classification of monitoring system	4
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	4
6	Characteristics and uses of climate observations at the global and national levels	4
7	International approaches to biomonitoring. Indicators used to conduct monitoring biodiversity at the global and national levels	4
8	World experience in organizing environmental monitoring systems	2

5. Topics for self-study

№	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 soils, water and food	12
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.

8.1. Distribution of points received by students

Type of learning activity	Learning outcomes	Assessment
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 biosphere; To be able to ground the choice of methods and places of observation for the state of environment; To be able to search for information using appropriate sources to make informed decisions	2
Laboratory class 1. Definitions and historical background of monitoring. Classification of monitoring system		10
Self-study 1. Factors and indicators that are studied in environmental monitoring		6
Lecture 2 The State Environmental Monitoring System of Ukraine	To have a knowledge about subjects, tasks and scheme of national monitoring system; To understand normative basis of national environmental monitoring system; To understand the basic environmental laws, rules and principles of environmental protection and nature management.	2
Laboratory class 2. Regulatory and policy framework of SEMS		10
Self-study 2. Informational support of SEMS. Data base organization and management		6
Lecture 3 Monitoring in the field of atmospheric air protection	To know programs of observation of the pollution sources and level of pollution; To demonstrate an understanding of the basic principles of environmental management and/or environmental projects.	2
Laboratory class 3. Analytical research methods of air condition		10
Self-study 3. Causes and sources of air pollution in Ukraine		5
Lecture 4 The state water monitoring	To solve problems in the field of environmental protection using generally accepted and / or standard approaches and international and national experience. To know programs of observation of the water pollution sources and level of pollution	2
Laboratory class 4. Physical and chemical parameters of water quality monitoring		10
Self-study 4. Monitoring of ocean and sea water pollutants		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. Assessment of land degradation	To be able to predict the impact of technological processes and industries on the	2

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

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Faculty of Plant Protection, Biotechnology and Ecology
“21” May 2026

CURRICULUM OF ACADEMIC DISCIPLINE
Environmental Monitoring

Field of knowledge E ‘Natural Sciences, Mathematics and Statistics’ _____
Specialty E2 Ecology _____
Academic programme "Ecology" _____
Faculty (Education and Research Institute): Faculty of Plant Protection, Biotechnologies
and Ecology
Author(s): Olena RAKOID, docent, PhD on agrarian sciences

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