

**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 Plant Protection,  
Biotechnologies and Ecology  
Yulia KOLOMIETS  
Protocol № 8 dated "23" 05 2024 p.

**"APPROVED"**  
at the meeting of the department of General Ecology,  
Radiobiology and Safety of Life Activity  
Protocol № 11 dated "22" 05 .2024 p.

Head of Department  
Alla KLEPKO

**"REVIEWED"**  
Program Coordinator "Ecology"  
Program Coordinator  
Volodymyr BOGOLYUBOV

**PROGRAM OF THE COURSE**

Environmental Monitoring

Field of study 10 Natural sciences  
Specialization 101 Ecology  
Educational program "Ecology"  
Faculty (Institute) Faculty of Plant Protection, Biotechnologies and Ecology  
Developers: docent Rakoid O.O., PhD on agrarian sciences  
(position, academic degree, academic title)

Kyiv – 2024 p.

**Description of the discipline: Environmental Monitoring**

(name)

<b>Academic degree, specialty, academic programme</b>		
Academic degree	<i>Bachelor's</i>	
Specialty	<i>101 Ecology</i>	
Academic programme	<i>"Ecology"</i>	
<b>Indicators of the discipline for full-time and part-time forms of university study</b>		
Type	Compulsory	
Total number of hours	150	
Number of ECTS credits	5	
Number of modules	2	
Course project (work) (if any)	20	
Form of assessment	<i>Exam</i>	
<b>Indicators of the course for full-time and part-time forms of study</b>		
	Full-time	Part-time
Year of study	3	
Semester	5	
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	<i>4 hours</i>	

**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):

GC02. Skills in the use of information and communication technologies.

GC06. Ability to communicate with representatives of other professional groups of different levels (with experts from other fields of knowledge/economic activities).

Special (professional) competences (SC):

SC07. Ability to conduct environmental monitoring and environmental assessment.

SC10. Ability to use modern information resources for environmental research.

SC13. Ability to participate in the management of environmental actions and/or environmental projects.

Expected Learning Outcomes (ELO):

ELO5. To know the conceptual basis of environmental monitoring and rationing of anthropogenic pressure on the environment.

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

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

## 2. Programme and structure of the discipline for:

–full-time (part-time) form of study;

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.st	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	
<b>Module 1. Fundamentals of environmental monitoring. National framework of monitoring</b>														
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. Air pollution and air monitoring	5-6	20	4		4		12							
Topic 4. Monitoring of surface water	7-8	20	4		4		12							

Total for module 1	77	16		16		45							
<b>Module 2. Environmental approach in ecological monitoring</b>													
Topic 1. Land and soil monitoring. Assessment of land degradation	9-10	20	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) (if included in the curriculum)													
Total hours		150	30		30		90						

### 3. Topics of laboratory classes

No	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

#### 4. 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 over 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

#### 5. Tools for assessing expected learning outcomes:

- credit;
- module tests;
- calculations and graphical calculations;
- defence of practical works;
- esse writing.

#### 6. Teaching methods:

- verbal method (lecture);
- practical method (practical training, task solution);
- visual method (method of illustrations, method of demonstrations);
- video method (remote, multimedia, web-based);
- independent work (completion of tasks).

#### 7. Assessment methods:

- credit;
- oral or written questionnaire;
- modular testing;
- esse;
- defence of practical works;
- presentations and performances at scientific events.

#### 8. Distribution of points received by students

The assessment of students' knowledge and skills is conducted by means of a 100-point scale and is converted into national grades according to Table 1 of the current *Exam and Credit Regulations at NULES of Ukraine*.

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

To determine a student's rating in the discipline  $R_{DIS}$  (up to 100 points), the received assessment rating  $R_A$  (up to 30 points) is added to the academic performance rating  $R_{AP}$  (up to 70 points):  $R_{DIS} = R_{AP} + R_A$ .

### 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. Київ, 1998. - 7с.

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/](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/>