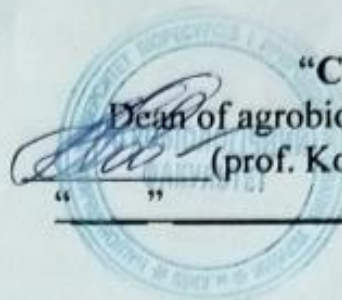




**NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES
OF UKRAINE**

Department of Analytical and Bioinorganic Chemistry and Water quality


"CONFIRMED"
Dean of agrobiological faculty
(prof. Kovalenko V. P.)
" " _____ 2024 p.

"APPROVED"
at the meeting of the department of
Analytical and Bioinorganic chemistry
and Water quality
Protocol №11 from "23" May 2024

Head of the Department
(prof. Kopilevich V.A.)

"REVIEWED"
Program Coordinator
"Agronomy"
(prof. Kovalenko V. P.)


**WORKING PROGRAM OF EDUCATIONAL DISCIPLINE
AGROECOLOGY**

Branch of knowledge Agricultural sciences and food

Specialty 201 - Agronomy

Educational program Agronomy

Faculty (Institute) Agrobiological

Developers: Assoc. prof, PhD associated professor of Department of Analytical and Bioinorganic Chemistry and Water Quality Kravchenko O.O

Kyiv – 2024 p.

Academic discipline description Agroecology

Field of knowledge, specialty, educational program, educational degree		
Academic degree	<i>Bachelor's</i>	
Specialty	<i>201 - Agronomy</i>	
Academic program	<i>Agronomy</i>	
Characteristics of the discipline		
Type	<i>Compulsory</i>	
Total amount of hours	90	
Total amount of ECTS	3	
Total amount of modules	2	
Course project (work) (if available)	-	
Form of assessment	<i>exam</i>	
Indicators of the discipline for full-time and part-time forms of study		
	Full-time	Part-time form
Year of study)	1	
Semester	2	
Lectures	<i>15 hours</i>	
Practical, seminar classes	<i>15 hours</i>	
Laboratory classes		
Self-study	<i>60</i>	
Number of hours per week for full-time students	2	

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

Aim is to form students a holistic view of the phenomena and processes in the agricultural sphere, to master new approaches, principles and methods of conducting ecologically balanced agriculture, to get familiar with the means of reproducing the productivity of modern agricultural landscapes and to ensure the production of ecologically safe products and formation of ecological awareness.

Objectives:

- provision of knowledge about methods and means of increasing the productivity of agroecosystems and reducing the negative impact on the environment;
- study of the main properties, structure and functioning of agrobiogeocenoses as artificial ecosystems.
- understanding the principles of ecologically balanced agriculture;

- mastering methods for assessing the ecological state of agroecosystems and its components

Acquisition of competences:

Integral competence (IC):

The ability to solve complex specialized tasks and practical problems in agronomy, which involves the application of theories and methods of the relevant science and is characterized by complexity and compliance with zonal conditions.

General competences (GC):

GC 7. Ability to apply knowledge in practical situations;

GC 8. Skills of performing safe activities;

GC 11. Efforts to preserve the environment.

Special competences (GC):

SC 7. The ability to scientifically use fertilizers and plant protection products, considering their chemical and physical properties and impact on the environment.

SC 9. Ability to manage complex actions or projects, responsibility for decision-making in specific production conditions.

Program learning outcomes:

PLO 9. To have at the operational level the methods of observation, description, identification, classification, as well as cultivation objects and maintaining the stability of agrocenoses with conservation of natural diversity;

PLO 10. Analyze and integrate knowledge from general and special professional training to the extent necessary for specialized professional work in the field of agronomy;

PLO 11. To initiate an operational and expedient solution production problems according to zonal conditions;

PLO 13. Design and organize cultivation activities high-quality agricultural products

2. Program and structure of the discipline for:

– full-time (part-time) form of students;

Modules and topics	Hours						
	Full time						
	Weeks	Total	including				St.s
1			p	lab	ind		
1	2	3	4	5	6	7	8
Module №1. Agroecosystems and their natural-resource potential							
Topic #1. Scientific bases of agroecology. The purpose and tasks of discipline studying	2	10	2	2		-	6
Topic #2. State and modern problems of the agricultural sector	2	14	2	2		-	10
Topic #3. Peculiarities of the functioning and stability of agroecosystems	2	16	2	2		-	12
Total hours (module 1)	40 hours		6	6		-	28
Module №2. Theoretical and methodological principles of agroecological monitoring							
Topic #4. Ecological problems related to the use of pesticides and agrochemicals	2	10	2	2		-	6
Topic #5. Soil as a basic component of agroecosystem	1	9	1	2		-	6

Topic #6. Importance of water quality in agriculture	4	14	4	2		-	8
Topic #7. Problems of preserving the biodiversity of ecosystems	1	8	1	1		-	6
Topic #8. Biological method of agroecological monitoring. Bioindication and bioassay	1	9	1	2		-	6
Total hours (module 2)	50 hours		9	9		-	32
Total hours	90		15	15		-	60

3. Topic of practical classes

Topic	Topic title	Hours
Module №1. Agroecosystems and their natural-resource potential		
1.1	The basic concepts and laws of agroecology, and their practical implementation	4
1.2	The Agroecological characteristics of crops	2
1.3	Agrophytocenose as the main component of agrobiocenose	2
1.4	Ecological bases of crop rotation	2
Module №2. Theoretical and methodological principles of agroecological monitoring		
2.1	Nitrate pollution of plant products. Determination of nitrate content in food products.	4
2.2	Ecological and agrochemical soil assessment	2
2.3	Determination of the total hardness of water by the complexometric method	8
2.4	Study of the composition of natural waters and assessment of their suitability for irrigation	2
2.5	Evaluation of the quality of the environment by bioassay	2

4. Topics of independent work

№	Назва теми	Total hours
1	Biogeochemistry of trace elements and agrochemicals	28
2	Basics of agronomic toxicology. Assessment of pesticide toxicity	32

5. Means of diagnosing learning outcomes::

- - exam;
- - module tests;
- - essays;
- - conducting laboratory experiments;
- - protection of laboratory works;
- - performing independent work
- - other types.

6. Teaching methods:

7. Assessment methods

- exam;
- credit;
- oral or written assessment;
- module tests;
- team projects;
- essays and reports;
- presentation of laboratory and practical works;
- presentations at academic events
- other types.

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*.

Students' rating, points	National grading of exams and credits	
	Exam	Credit
90-100	excellent	pass
74-89	good	
60-73	satisfactorily	
0-59	unsatisfactoril	fail

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_a (up to 30 points) is added to the rating of a student's academic work R_{ap} (up to 70 points): $R_{dis} = R_a + R_{ap}$.

9. Teaching and learning aids

- e-learning course of discipline;
- lectures and presentation (in electronic form);
- textbooks, training aids, workshops;
- guidelines for studying a discipline by full-time and part-time students

10. Recommended sources of information

Technology and methodological requirements

1. Methodological guidelines “Inorganic and analytical chemistry for bachelor students specialty 201 – “Agronomy”. Voitenko L.V., Kopilevich V.A., Prokopchuk N.M. Savchenko D.A., Kravchenko O.O. – Kyiv: Експо-Друк., 2022. - 219 p.

Required and recommended literature

1. Gliessman, S. R. (2021). *Package price agroecology: The ecology of sustainable food systems*. CRC press
2. Voitenko L. Chemistry with the foundations of biogeochemistry: manual. Kyiv: Naukova stolytsa, 2019. 400 p. (In Ukrainian).
3. Gliessman, S. R., Méndez, V. E., Izzo, V. M., & Engles, E. W. (2022). *Agroecology: Leading the transformation to a just and sustainable food system*. CRC Press.

Supplemental

1. McCune, N., & Rosset, P. (2021). 48. Agroecology. *Handbook of Critical Agrarian Studies*, 438.

IT resources

1. Ecology of agrosphere (handbook): https://www.agroeco.org.ua/wp-content/uploads/Publications/ecology_agrosphere.pdf ;
2. SEGAE: a serious game to learn agroecology <https://www.segae.org/game/>
3. Global Fertilizer impact monitor <http://bit.ly/3Z50IDS>