NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE
Department of Agroecology and Environmental Control

APPROVED
Faculty of Plant Protection,
Biotechnology and Ecology

"21"___05__2025_

CURRICULUM OF ACADEMIC DISCIPLINE
«Biodiversity and conservation »

Area of knowledge 10 Natural Sciences
Specialty 101 Ecology
Academic programme Ecology
Faculty of Plant Protection, Biotechnology and Ecology
Developed by: Associate Professor, PhD in Agricultural Sciences **L. Vagaliuk**

Kyiv – 2025

Description of the discipline «Biodiversity and conservation »

The discipline **"Biodiversity and Conservation"** introduces students to the fundamental principles of biological diversity, its significance for ecosystems and human well-being, as well as strategies for its conservation at local, national, and global levels. The course covers taxonomy, genetic, species, and ecosystem diversity, threats to biodiversity (e.g., habitat loss, invasive species, climate change), and approaches to conservation such as protected areas, ex situ conservation, ecological restoration, and biodiversity monitoring.

Special attention is given to international conventions (e.g., CBD, CITES), national legislation, and modern conservation tools including GIS, environmental impact assessment (EIA), and community-based conservation.

Field of knowledge, specialty, educational program, educational degree		
Educational degree	Bachelor	
Specialty	101"Ecology"	
Educational program	Ecology	
Characteristics of the discipline		
Kind of the discipline	Elective	
Total number of hours	120	
Credit amount ECTS	4	
Number of content modules	2	
Course project (work) for availability)	-	
Form of control	Exam	
Indicators of academic discipline for full-time and part-time forms of education		
	Full-time	Part-time
Year of preparation (course)	3	3
Semester	5	5
Lectures	30	2
Practical, seminar classes	30	-
Laboratory classes	-	-
Individual work	60	100
Number of weekly classrooms hours for full-time study	4	

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

The purpose of the course *"Biodiversity and Conservation"* is to introduce students to the fundamental principles of biodiversity research, including the application of biological knowledge and modern techniques for the qualitative and quantitative assessment of biodiversity. The course provides students with practical skills in ecosystem analysis, which are essential for studying population and interpopulation interactions.

The main objectives of the course are to:

- Explore core concepts of modern ecology and biology;
- Understand the evolution of living organisms within the biosphere;
- Analyze current environmental problems and identify sustainable solutions;
- Study key taxonomic groups of organisms in relation to their roles in natural and anthropogenic ecosystems.

Upon successful completion of the course, students will be able to demonstrate knowledge of:

- Principles and application of modern instrumental methods in biological and environmental research;
- Evolutionary mechanisms and speciation processes;
- Methods for assessing biodiversity and ecosystem diversity;
- Ecological theory and principles of environmental protection;
- Functional roles of biodiversity within ecosystems;
- The intrinsic and utilitarian value of biodiversity for human society;
- Principles of sustainable use of biological resources;
- Concepts of ecological stability and the socio-economic components of sustainability;
- Safety protocols for field and laboratory research.

Students will acquire the following practical skills:

- Applying environmental research methods to address typical professional challenges;
- Using digital tools to search for and share information across global and local networks;
- Characterizing plant communities at the phytocoenosis level;
- Completing standardized forms for geobotanical surveys;
- Describing vegetation structure, including plant stratification;
- Assessing anthropogenic impacts on biodiversity and ecosystems;
- Collecting population and demographic field data;
- Performing primary data processing and interpretation;
- Using scientific instruments in research and practice;
- Conducting step-by-step analysis of geobotanical information.

Competences acquired:

Acquisition of Competencies *(According to the approved Educational and Professional Program for the specialty 101 "Ecology")*

1. Integral Competence (IC): The ability to solve complex specialized tasks and address practical problems in the field of ecology, environmental protection, and sustainable nature management, which involves the application of fundamental theories and methods of environmental sciences, characterized by complexity and uncertainty of conditions.

2. General Competencies (GC):

GC08. Ability to conduct research at the appropriate level.

GC13. Ability to preserve and enhance moral, cultural, and scientific values and achievements of society based on an understanding of the history and patterns of development of the subject area, its place in the overall system of knowledge about nature and society, and in the development of society, technology, and engineering; ability to use various types and forms of physical activity for active recreation and maintaining a healthy lifestyle.

GC19. Ability to assess the impact of technogenic processes on the state of the environment and to identify environmental risks associated with industrial activities.

GC22. Ability to justify the necessity of and develop measures aimed at preserving landscape and biological diversity and forming an ecological network.

Program Learning Outcomes (PLO):

PLO06. Identify factors determining the formation of landscape and biological diversity.

PLO07. Solve problems in the field of environmental protection using generally accepted and/or standard approaches and both international and national experience.

2. Programme and structure of the discipline

Names of content modules and topics	Number of hours									
	full-time					part-time				
	total	including				total	including			
		l.	p.	lab.	ind.		l.	p.	lab.	ind.
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
Module 1. Fundamental Principles of the Study of Biodiversity										
Lecture 1.Biodiversity and Its Importance	8	2	2	-	4	14	2	-	2	10
Lecture 2. Levels of Biodiversity Organization	12	2	2	-	8	12		-	2	10
Lecture 3. Major Threats to Biodiversity	10	3	3	-	4	14	2	-	2	10
Lecture 4. Biodiversity Conservation	16	4	4	-	8	14	2	-	2	10
Lecture 5. Key Aspects of Ecological Corridor Development.	14	4	4	-	6	10		-		10
Total for the module 1	60	15	15	-	30	64	6	-	8	50
Module 2. Assessment of Biodiversity Status and Threat Evaluation										
Lecture 1. Biodiversity Conservation in Agricultural Landscapes	8	2	2	-	4	14	2	-	2	10
Lecture 2. River Ecological Corridors	8	2	2	-	4	12		-	2	10
Lecture 3. General Approaches to Assessing and Reducing Biodiversity Threats	14	3	3	-	8	10				10
Lecture 4. Ecosystem Functions of Biodiversity and the Ecological Concept of Nature Management	14	4	4	-	6	10				10
Lecture 5. Economic Valuation and Cost-Effectiveness of Biodiversity Conservation.	16	4	4	-	8	10				10
Total for the module 2	60	15	15	-	30	56	2	-	4	50
Total	120	30	30	-	60	120	8	-	12	100

3. Topics of lectures

No.	Topic	Hours
1	Biodiversity and Its Importance	2
2	Levels of Biodiversity Organization	2
3	Major Threats to Biodiversity	3
4	Biodiversity Conservation	4

5	Key Aspects of Ecological Corridor Development.	4
8	Biodiversity Conservation in Agricultural Landscapes	2
9	River Ecological Corridors	2
10	General Approaches to Assessing and Reducing Biodiversity Threats	3

4. Topic of laboratory (practical, seminars) classes

№	Topics	Number hours
	Module 1. Basic of biodiversity	
1	Biodiversity as an objective factor in assessing the state of the environment and the stability of ecosystems	2
2	Biodiversity of Ukraine and principles of protection	2
3	The main causes of biodiversity loss	3
4	Footprint and assessment	4
5	Rare and endangered species of flora and fauna in Ukraine	4
	Module 2. Characteristics and assessment of threats to biodiversity	
6	The main provisions of environmental legislation in the field of biotic and landscape diversity	2
7	Study of the structure of the state cadastre of flora in Ukraine	2
8	Status and prospects of development of the protected area in Ukraine	3
9	Criteria for the formation of the ecological network in Ukraine	4
10	Determining the amount of damage caused by the illegal destruction of wild animals	4
	Total	30

5. Topics of self-study

No.	Topic	Number hours
1.	Levels of Biodiversity: Genetic, Species, and Ecosystem	4
2.	Causes of Biodiversity Loss in the Modern World	4
3.	Impact of Climate Change on Biodiversity: Global and Local Examples	5
4.	The Role of Protected Areas in Biodiversity Conservation	4
5.	Invasive Species: A Threat to Native Ecosystems	4
6.	The Red Data Book of Ukraine: Structure, Criteria, and Examples of Protected Species	4
7.	Ecosystem Services as an Argument for Biodiversity Conservation	3
8.	Urbanization and Its Impact on Urban and Suburban Biota	3
9.	The Convention on Biological Diversity: Goals and Implementation in Ukraine	3
10.	The Ecological Network of Ukraine as a Tool for Nature Protection	3
11.	Modern Methods for Biodiversity Monitoring	4
12.	The Role of Civil Society Organizations in Biodiversity Conservation	3
13.	Restoration of Natural Ecosystems: Principles and Practical Examples	4
14.	Flagship, Indicator, and Keystone Species: Their Importance for Nature Conservation	3
15.	Biodiversity of the Carpathian Region: Uniqueness and Conservation Measures	3
	Total	60

6. Methods of assessing expected learning outcomes:

- Oral or written questioning
- Exam
- Module tests
- Essays, presentations
- Calculations (individual assignments**)**
- Defense of practical works

7. Teaching methods*:*

- Verbal method (lecture, discussion, interview, etc.)
- Practical method (laboratory and practical classes)
- Visual method (illustration method, demonstration method)
- Working with educational and methodological literature (note-taking, summarizing, annotating, reviewing, writing essays)
- Video method (distance learning, multimedia, web-based formats, etc.)
- Independent work (completion of assignments)
- Individual research work of higher education students

8. Results assessment.

The student's knowledge is assessed by means of a 100-point scale converted into the national grades according to the "Exam and Credit Regulations at NULES of Ukraine" in force.

8.1. Distribution of points by types of educational activities

Educational activity	Results	Assessment
Module 1. Sustainable Agricultural Practices and Ecosystem Management		
Practical work №1. Biodiversity as an objective factor in assessing the state of the environment and the stability of ecosystems	To become familiar with the main levels of biodiversity, its ecological role, and indicators of the state of biota as indicators of environmental quality. To learn how to use bioindicator approaches for assessing ecosystem stability. To study examples of biodiversity assessment at the local level.	10
Practical work № 2. Biodiversity of Ukraine and principles of protection	To become familiar with the structure of biodiversity in Ukraine, including key species, habitats, and ecosystem types. To understand the ecological role of national biodiversity and the main threats to its conservation. To study principles and legal instruments of biodiversity protection in Ukraine, including protected area networks and conservation strategies.	10
Practical work № 3. The main causes of biodiversity loss	To explore the major anthropogenic and natural drivers of biodiversity loss at both global and national levels. To gain a comprehensive understanding of how these factors impact ecosystems, species, and genetic diversity. To develop analytical skills for evaluating and classifying threats to biodiversity and their implications for ecological stability and sustainable development.	10
Practical work № 4. Footprint and assessment	To understand the concept of ecological footprint and its use in assessing the	10

	environmental impact of human activities. To study quantitative approaches for evaluating natural resource consumption and the sustainability of ecosystems. To develop the ability to interpret footprint indicators and apply them in environmental assessments at local, national, and global levels.	
Practical work № 5. Rare and endangered species of flora and fauna in Ukraine	To explore the diversity of rare and endangered species of plants and animals in Ukraine. To develop an understanding of the causes of their decline and the strategies used for their protection. To study national and international conservation tools, such as the Red Book of Ukraine and relevant global conventions.	10
Self-study 1. Existing and optimal structure of nature management in Ukraine.	To conduct an analysis of the structure of nature use in the region and Ukraine as a whole, to determine its optimal option.	10
Self-study 2. Biodiversity Assessment in Local Ecosystems: Field Survey and Data Analysis	Conduct a biodiversity survey in a chosen local ecosystem (e.g., park, forest patch, urban green area, wetland). Identify and record species of plants, animals, or fungi present in the area. Analyze species diversity using appropriate indices and evaluate the ecological health of the ecosystem.	10
Module control work 1.		**30**
Total for module 1	PLO 06, PLO 07.	**100**
Module 2. Characterization of the state and assessment of threats to biodiversity		
Practical work № 1. The main provisions of environmental legislation in the field of biotic and landscape diversity	To explore the structure, historical evolution, and current trends in the development of the protected area (PA) network in Ukraine. To understand the ecological and legal foundations of nature conservation and analyze the role of PAs in preserving biodiversity and landscape diversity.	10
Practical work № 2. Study of the structure of the state cadastre of flora in Ukraine	To study the methods and approaches for assessing chemical pollution of soils in urban and rural settlements. To understand sources, types, and distribution of soil contaminants, and their impacts on soil health, ecosystem functions, and human well-being.	10
Practical work № 3. Status and prospects of development of the protected area in Ukraine	To study the principles and methods for assessing the ecological status of aquatic environments, including rivers, lakes, and wetlands. To understand the factors influencing water quality and ecosystem health, and to develop skills in monitoring and evaluating aquatic ecosystems.	10
Practical work № 4. Criteria for the formation of the ecological network inUkraine	To study the processes and mechanisms of ecological succession in agrobiocenoses. To analyze the dynamics of species composition, structure, and function during succession stages in agricultural ecosystems. To develop practical skills in monitoring and evaluating successional changes for sustainable agroecosystem management.	10

Practical work № 5. Determining the amount of damage caused by the illegal destruction of wild animals	To study methods for detecting and quantifying nitrate contamination in food products. To understand sources and health risks associated with nitrate pollution. To develop practical skills in sampling, chemical analysis, and interpretation of nitrate levels in food.	10
Self-study 1. Population and species levels of biodiversity organization	To get acquainted with the population-species level of biodiversity, to learn to calculate the individual links between the ecological pyramid, to master the rules of the ecological organization of the pyramid, to learn to determine the position of living organisms in trophic chains.	10
Self-study 2. Assessment of Biodiversity in Urban Green Spaces	To evaluate the biodiversity of urban green spaces by identifying species diversity and abundance, and to assess the impact of urbanization on ecosystem health.	10
Module control work 2.		
Total for module 2	PLO 06, PLO 07	**100**
Class work		**(M1 + M2)/2*0,7 ≤ 70**
Exam/credit		**30**
Total for year		**(Class work + exam) ≤ 100**

8.2. Scale for assessing student's knowledge

Student's rating, points	National grading (exam/credits)
90-100	excellent
74-89	good
60-73	satisfactory
0-59	unsatisfactory

8.3. Assessment policy

Deadlines and exam retaking rules	*EXAMPLE:* 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 rules	*EXAMPLE:* cheating during tests and exams is prohibited (including using mobile devices). Term papers and essays must have correct references to the literature used
Attendance rules	*EXAMPLE:* 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:

- e-learning course of the discipline (https://elearn.nubip.edu.ua/course/view.php?id=5217);
- references to digital educational resources;
- textbooks, manuals, tutorials;
- guidelines for studying a discipline by full-time and part-time students;
- internship programmes of the discipline (if included in the curriculum)

1. Vagaliuk L.V. Biodiversity: Ecological Aspects. Lecture Course for Master's Students in the Specialty 101 Ecology. – Kyiv: NULES of Ukraine, 2021. – 160 p.

2. Vagaliuk L.V. Methodical Recommendations for Laboratory and Practical Work in the Discipline “Biodiversity and Its Conservation” for Students of the Specialty 101 Ecology. – NULES of Ukraine, 2022. – 83 p.
3. Vagaliuk L.V., Lisovyi M.M. Biodiversity and Its Conservation: Textbook. – Kyiv, 2023. – 310 p.

10. Recommended sources of information

1. Agrobiodiversity of Ukraine: theory, methodology, indicators and examples. Book (Edited by Academician of the National Academy of Sciences of Ukraine and the Ukrainian Academy of Agrarian Sciences - O.O. Sozinov and PhD V.I. Prydatko: Sozinov O.O., Prydatko V.I., Tarariko O.G. and others. - Kyiv: CJSC "Nichlava". 2005. - 384 c.

2. Chayka V.M., Vagaliuk L.V. Ecological principles of conservation of agrobiodiversity of insect dendrobionts of the Northern Forest-Steppe of Ukraine: Monograph / V.M. Chaika, L.V. Vagaliuk / edited by Doctor of Agricultural Sciences, Professor V.M. Chaika - Kyiv, CP "Komprint", 2018. 174 p.

3. Vagaliuk L.V. Use of ecological network as a measure of biocenotic amelioration of agrolandscapes of Ukraine //International scientific and practical conference “Challenges, threats and developments in biology, agriculture, ecology, geography, geology and chemistry”: conference proceedings, July 2-3, 2021. Lublin: “Baltija Publishing” doi https //doi.org/10.30525/978-9934-26-111-4-11

4. Vagaliuk L. Assessment of the state of entomofauna biodiversity on the sanitary protection zone of the poultry farm Kyivska // Scientific journal "Biological Systems: Theory and Innovation." - Том 12, № 2 (2021) http://journals.nubip.edu.ua/index.php/Biologiya/article/view/15482

doi https //doi.org 10.31548/biologiya2021.02.00410.

5. Decision III/11: Conservation and sustainable use of agricultural biological diversity/Handbook of the Convention on Biological Diversity. 2nd edition (Updated to include the outcome of the sixth meeting of the Conference of the Contracting Parties. Secretariat of the Convention on Biological Diversity. 2018, pp 392-400.

6. V. Prydatko - Remote Sensing (RS) and Geographic Information Systems (GIS) as New Tools for Improvement of Woodland Inventory, Management and Woodland Protected Areas Development in Ukraine / CD -Conference on Woodland Key Habitats. Bialowiza, 2002, Poland.

7. Vagaliuk L**.** Guidelines to conduct practicals in the discipline “Biodiversity” for the "Bachelor" students in the specialty 101 «Ecology» / Compiler: associate professor L. Vagaliuk, Kyiv: NULES Publishing House of Ukraine, 2022. - 91 p.

8. The Law of Ukraine, http://uk.wikipedia.org/wiki/ Wikipedia, the free encyclopedia, http://www.sea.gov.ua/GIS/BSR/UA/documents/legislation/Prog_bio.htm Draft National Program for the Conservation of Biodiversity of Ukraine for 2007-2025

9. Sixth National Report on the Implementation of the UN Convention on Biological Diversity by Ukraine, https://mepr.gov.ua/files/images/news_2019/31102019/CBD_all_UKR-fin.pdf7.

10. Petrenko O. The system of landscape structuring of the country and landscape regulation of types of nature use / National Ecological Network of Ukraine: Priorities of formation // Collection of articles and speeches at the national conference 22.01.21.-K.: 2021

Information Resources

1. Law of Ukraine, Draft National Program for Biodiversity Conservation of Ukraine for 2007–2025http://www.sea.gov.ua/GIS/BSR/UA/documents/legislation/Prog_bio.htm
2. Sixth National Report on Ukraine's Implementation of the UN Convention on Biological Diversity https://mepr.gov.ua/files/images/news_2019/31102019/CBD_all_UKR-fin.pdf
3. Petrenko O. Landscape Structuring System of the Country and Landscape Regulation of Types of Nature Management / National Ecological Network of Ukraine: Priorities of Formation // Collection of Articles and Presentations at the National Conference, 22.01.21. – Kyiv, 2021. – Pp. 28-33.

Regulatory Documents

International Regulatory Documents

1. Convention on Biological Diversity (CBD), 1992 — the main international treaty regulating biodiversity conservation, sustainable development, and use.
2. UN Framework Convention on Climate Change (UNFCCC), 1992 — defines measures to limit climate change impacts affecting biodiversity.
3. Bern Convention on the Conservation of European Wildlife and Natural Habitats, 1979 — aimed at protecting European species and their habitats.
4. CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), 1973 — regulates international trade of endangered species.
5. UN Convention to Combat Desertification, 1994 — sets measures to prevent land degradation and conserve biodiversity in drylands.

National Regulatory Documents of Ukraine

1. Law of Ukraine "On Environmental Protection" (dated 25.06.1991 No. 1264-XII) — the main legislative act regulating nature protection.
2. Law of Ukraine "On the Nature Reserve Fund of Ukraine" (dated 16.06.1992 No. 2456-XII) — establishes legal foundations for creation and protection of nature reserve territories.
3. Law of Ukraine "On the Animal World" (dated 15.12.2000 No. 2347-III) — regulates protection, use, and reproduction of the animal world.
4. Law of Ukraine "On the Plant World" (dated 15.02.1999 No. 532/99-VR) — regulates protection, use, and reproduction of the plant world.
5. National Biodiversity Conservation Strategy of Ukraine (approved by Cabinet of Ministers of Ukraine Resolution No. 620 dated 14.07.2010) — a comprehensive document defining state policy directions in biodiversity conservation.
6. Cabinet of Ministers of Ukraine Resolution "On Approval of the List of Objects of the Nature Reserve Fund of Ukraine" (No. 815 dated 17.10.2012) — regulates protection of natural territories.