



## SYLLABUS OF AN ACADEMIC DISCIPLINE «Fundamentals of Biodiversity»

Degree of higher education - Bachelor  
Specialization 162 «Biotechnology and bioengineering »  
Educational programme «Biotechnology and bioengineering »  
Academic year 2, semester 3  
Form of study y compulsory (full-time)  
Number of ECTS credits 4  
Language of instruction English

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Lecturer of the course  
Lecturer's contact  
information of the lecturer  
(e-mail)  
URL of the e-learning  
course on the NULES  
elearning portal

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### ***ACADEMIC DISCIPLINE DESCRIPTION***

The aim of study of discipline to form a clear understanding of the principles of modern methods of research of biological objects and the environment, to provide and practically master the basic knowledge and skills in the use of various tools in the processes of scientific fundamental and practical research. The course “Fundamentals of Biodiversity” is aimed at familiarizing future specialists with the basic principles of monitoring, inventory of species biodiversity and natural resources.

An objectives consolidation and mastery of the basic concepts of biogeography, evolutionary ecology, to take into account diversity at different levels of organization life: molecular, genetic, cellular, taxonomic, ecological and others, to understand the patterns of anthropogenic transformation of flora and fauna, to take into account the peculiarities of the spread of invasive species and to predict their impact on the species richness and stability of natural ecosystems, and assess possible risks.

The theoretical course “Fundamentals of Biodiversity” is supported by practical developments that enable future specialists to master the skills of collecting and analyzing primary information, assessing species richness and diversity, determining the level of dominance of individual species in the biocenosis, assessing the age composition of organisms in populations, and determining similarity indices of flora and fauna.

#### **Competences of the discipline:**

Integral Competence (IC): The ability to solve complex specialized tasks and practical problems characterized by complexity and uncertainty in biotechnology and bioengineering, or in a learning process involving the application of theories and methods of biotechnology and bioengineering.

#### **General competences (GC):**

- C01. Ability to apply knowledge in practical situations
- C05. Ability to learn and master modern knowledge
- C09. Ability to preserve and enhance moral, cultural, 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 general system of knowledge about nature and society and in the

development of society, technology and technology, to use different types and forms of physical activity for active recreation and healthy lifestyle.

**Special (professional, subject) competences (SC):**

C13. Ability to work with biological agents used in biotechnological processes (microorganisms, fungi, plants, animals, viruses, their individual components).

C25. Development of technologies for the creation of cell and tissue culture as biological systems, modification of the genome of plants and microorganisms in order to improvement of their quality characteristics and properties, expansion of genetic diversity of source material for breeding, labeling, certification and expertise, and to theoretically substantiate areas of scientific research.

**Expected Learning Outcomes (ELO):**

ELO07. Be able to apply knowledge of the composition and structure of cells of various biological agents to determine the optimal conditions of cultivation and the potential of using the studied cells in biotechnology.

ELO22. To be able to take into account social, environmental, ethical, economic aspects, labour protection, occupational health and safety and fire safety requirements when formulating technical solutions. Be able to use different types and forms of physical activity for active recreation and healthy lifestyle.

ELO24. Be able to apply cryopreservation and cryopreservation to preserve biodiversity of plants and microorganisms. to identify of recombinant clones, conduct clonal micropropagation of plants and obtain virus-free planting material and adapt it to ex vivo conditions.

**ACADEMIC DISCIPLINE STRUCTURE**

<b>Topic</b>	<b>Hours</b> (lecture/laboratory)	<b>Learning outcomes</b>	<b>Tasks</b>	<b>Assessment</b>
<b>Module 1. Definition, meaning and classifications of biodiversity (genetic, species, ecological/ecosystem). Methods of biodiversity assessment. Biodiagnostics (indication) of the state of cenosis.</b>				
<b>Topic 1.</b> Definition, importance and classification of biodiversity (genetic, species, ecological/ecosystem). Methods of biodiversity assessment. Biodiagnostics (indication) of the state of cenosis.	2/2	To know the theoretical and practical tasks of the discipline. Be able to professionally select the necessary methods for analysing the biodiversity of various biocenoses and ecosystems. Identify levels and functions of biodiversity. Assess the environmental situation. To consider the problem of biodiversity in terms of preserving the diversity of different levels of organisation of living things, as well as preserving the structural and functional organisation of ecosystems' sustainability as a necessary condition	Objectives of the laboratory (practical) work: to get acquainted with the modern requirements and rules of work in educational and research laboratories and basic microscopic research methods. Study of soil fauna (diversity of algae) To get acquainted with different types of soil	tests, individual tasks, self-control of knowledge, interview

		for the existence of biota.	algae, their structures, features, methods of isolation from the soil. Algodiagnostics. Writing tests, essays, abstracts of scientific publications in the field.	
<b>Topic 2.</b> Methods of assessment biodiversity.	2/2	Know the practical tasks of the discipline. Know the key features, characteristics, ecological niches of micromycetes (soil representatives). The role of soil in the formation and conservation of biodiversity.	Objectives of the laboratory (practical) work: to study the morphology, ecology and diversity of micromycetes.	tests, individual tasks, self-control of knowledge
<b>Topic 3.</b> Biodiagnostics (bioindication) of the state of cenosis.	4/4	Study of the main provisions of modern diagnostics and indication of cenosis, the main issues of protection and ecological status, rational use of natural resources and resource provision in accordance with the current conditions.	Objectives of the laboratory (practical) work: to get acquainted with the principles of selection of criteria for assessment and bioindication of cenosis.	Tests, individual tasks, interview.
<b>Total from educational work of module 1</b>				<b>70</b>
<b>Module 1</b>		Assessment of the results of learning knowledge and skills in accordance with the topics included in module 1	Test	<b>30</b>
<b>Total for Module 1</b>				<b>100</b>
<b>Module 2. Scheme and main stage biotech industries.</b>				
<b>Topic 1.</b> Threats to biodiversity. The rate of species extinction. Anthropogenic impact on the stability of biosystems. Changes	4/4	To know the theoretical and practical tasks of the discipline: the main threats to biodiversity, anthropogenic impact on biological systems, climate change.	Tasks of laboratory (practical) work: multilevel study of biological objects, monitoring results.	individual tasks, interview.

in the of climate.			Essays, presentations, abstracts of scientific publications in the field	
<b>Topic 2.</b> Monitoring of of biodiversity. Indices and models of biodiversity.	3/3	To know the theoretical and practical tasks of the discipline: biodiversity as the most objective factor in assessing the state of the environment and ecosystem sustainability. Ecosystem biodiversity as a criterion of stability, a measure of ecosystem reliability in a given situation. The relationship of biodiversity to nature conservation and the development of biosphere monitoring systems. Monitoring of biodiversity.	Tasks of laboratory (practical) work: monitoring studies of biodiversity. Essays, presentations, abstracts of scientific publications in the field.	Individual tasks, interview
<b>Total from educational work of module 2</b>				<b>70</b>
<b>Module 1</b>		Assessment of the results of learning knowledge and skills in accordance with the topics included in module 1	Test	<b>30</b>
<b>Total for Module 1</b>				<b>100</b>
<b>Total for the semester</b>				<b>70</b>
<b>Exam</b>				<b>30</b>
<b>Total for course</b>				<b>100</b>

### ASSESSMENT POLICY

<b><i>Deadlines and exam retaking policy:</i></b>	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). Assignments submitted after the deadline without valid reasons will be graded lower. Resetting of modules will be allowed with the permission from the lecturer and in the presence of valid reasons (e.g. medical reasons).
<b><i>Academic integrity policy:</i></b>	Cheating during tests and exams is strictly prohibited (including the use of mobile devices). Term papers and essays must contain correct citations for all sources used.
<b><i>Attendance policy:</i></b>	Attendance is compulsory. For good reasons (e.g. illness,

	international internship), training can take place individually (online by the faculty dean's consent) Class attendance is mandatory. In case of objective reasons (such as illness or international internships), individual learning may be allowed (in online format by the approval of the dean of the faculty).
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### SCALE OF ASSESSMENT OF STUDENT KNOWLEDGE

Student rating, points	National grade based on exam results	
	exams	credits
90-100	excellent	passed
74-89	good	
60-73	satisfactory	
0-59	unsatisfactory	not passed

### RECOMMENDED SOURCES OF INFORMATION

1. Fundamentals of biodiversity: theory and practice: a textbook. O.L. Klyachenko and others - Vinnytsia, Nilan LTD, 2015. 128 p.
2. Klyachenko O.L., Lisovyi M.M., Kvasko O.Y. Fundamentals of biodiversity. Textbook. K., 2022. - 300 p.
3. Dictionary of modern ecological and environmental terms. K.: Nauk. svit, 2010. - 67 p. - Dictionary of modern ecological and environmental terms / [compiled by Goncharenko GE, Sovgira SV].
4. Conservation and exhaustive use of biodiversity of Ukraine: state and prospects. and prospects. K.: Himjest, 2003. - 248 p.
5. Biodiversity: Questions and answers. Kyiv: Green Ukraine, 2006.
6. The Law of Ukraine "On the Nature Reserve Fund of Ukraine" (16.06.1992). (16.06.1992) / Bulletin of the Verkhovna Rada of Ukraine, 1992, No. 34.
7. The Law of Ukraine "On the National Program of Formation of the National Ecological Network of Ukraine for 2000-2015" of the National Ecological Network of Ukraine for 2000-2015" / Uryadovyi Courier, 8.11.2000 p., № 207.
8. Marushevskiy G.B., Melnychuk V.P., Kostiusyn V.A. Conservation of biodiversity and creation of ecological Biodiversity conservation and creation of an ecological network - Kyiv, WIBSP, 2008.
9. Reserves and National Parks of Ukraine - Kyiv, 1999.
10. Pan-European Strategy for the Conservation of Biological and Landscape Diversity. Kyiv: Avalon, 1998.
11. Yatsyk A. V., Hryshchenko Y. M., Yakymchuk A. Y., Pashenyuk I. A.; eds. A. V. Yatsyk. Ecology of biodiversity. K.: Genesis, 2013. 408 c.
12. Sheliag-Sosonko Y.R., Dubyna D.V., Vakarenko L.P. et al. Conservation and sustainable use of biodiversity of Ukraine: state and and prospects. K.: Chemjest, 2003. 248 p.
13. Kobenyok G.V., Zakorko O.P., Marushevskiy G.B. Conservation of biodiversity, creation of ecological biodiversity, creation of an ecological network and integrated river basin management. K.: Wetlands International Black Sea Program, 2008. 200 c.