

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

V.F. Peresykin Department of Phytopathology

APPROVED

Faculty Plant Protection,
Biotechnologies and Ecology
Minutes No. 9 of “_may_”2026

**CURRICULUM OF ACADEMIC DISCIPLINE
GENERAL MYCOLOGY**

Area of knowledge 20 Agricultural sciences and food
Specialty H1 Agronomy
Academic programme Plant Protection and Quarantine
Faculty Plant Protection, Biotechnologies and Ecology
Developed by: Vuiek A.O., Senior Lecturer, Dr. PhD

Description of the discipline GENERAL MYCOLOGY

General Mycology is one of the fundamental disciplines in the education and training of plant protection specialists. It provides comprehensive knowledge of the morphological, physiological, and biological characteristics of fungi, their roles in natural ecosystems and agroecosystems, as well as their impact on the phytosanitary status of plants.

This discipline is closely integrated with a range of basic and specialized subjects, including Botany, Plant Physiology, Microbiology, Soil Science, Crop Production, Biochemistry, Biotechnology, Phytopathology, Plant Immunity, Plant Breeding, and Seed Science. The knowledge gained in General Mycology serves as an essential foundation for understanding plant–pathogen interactions, diagnosing fungal diseases, and developing effective plant protection strategies.

Area of knowledge, specialty, academic programme, academic degree		
Academic degree	<i>bachelor's</i>	
Specialty	<i>HI Agronomy</i>	
Academic programme	<i>Plant Protection and Quarantine</i>	
Characteristics of the discipline		
Type	<i>compulsory</i>	
Total number of hours	<i>180</i>	
Number of ECTS credits	<i>6</i>	
Number of modules	<i>4</i>	
Course project (work) (if any)	<i>-</i>	
Form of assessment	<i>exam / credit</i>	
Indicators of the discipline for full-time and part-time forms of university study		
	University study	
	Full-time	Part-time
Year of study	<i>2</i>	<i>3</i>
Term	<i>3, 4</i>	<i>5, 6</i>
Lectures	<i>60 h.</i>	<i>4 h.</i>
Practical classes and seminars		
Laboratory classes	<i>60 h.</i>	<i>-</i>
Self-study	<i>60 h.</i>	<i>176 h.</i>
Number of hours per week for full-time students	<i>4 h.</i>	<i>3</i>

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

General mycology is one of the main profiling disciplines in the training of a specialist in plant protection. It is closely related to many general biological and special disciplines: botany, plant physiology, microbiology, soil science, agriculture, plant biochemistry and biotechnology, general and agricultural phytopathology, plant immunity, zoology, general and agricultural entomology, plant breeding, breeding and seed production

Competences acquired:

Integral competence (IC):

The ability to solve complex specialized tasks and practical problems of professional activity in plant protection and quarantine and to apply theoretical knowledge and methods of phytosanitary monitoring, inspection, analysis, expertise characterized by complexity and uncertainty of conditions.

General competences (GC):

GC 2. Ability to apply knowledge in practical situations.

GC 3. Knowledge and understanding of the subject area and understanding of professional activity.

GC 12. Skills of performing safe activities.

Expected Learning Outcomes (ELO):

ELO 6. Correctly apply appropriate methods of observation, description, identification, classification, and cultivation of agrobiocenosis objects, as well as methods for maintaining their stability to preserve natural biodiversity.

ELO 16. To know the main historical stages of the development of the subject area.

Modules and topics	Number of hours													
	full-time							part-time						
	weeks	total	including					in 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	
Module 1. STRUCTURE OF FUNGI														
Topic 1. Introduction to Mycology: Historical development, contemporary importance, and principles of fungal systematics and nomenclature.		12	6		3		3	12	1					11
Topic 2. Mycelium and its variations		16	6		5		5	16						16
Topic 3. Fungi as a constituent structure of the vegetative body of lichens		6	2		2		2	6						6
Total for module 1		34	14		10		10	34	1					33
Module 2. BIOCHEMICAL PROPERTIES OF FUNGI														
Topic 1. Nutrition of fungi		14	4		4		6							13
Topic 2. Fungal metabolism		14	8		12		6	14						14
Topic 3. Biologically active substances of fungi		28	16		20		8	28						28
Total for module 2		56	16		20		20	56	1					55
Module 3. GEOGRAPHICAL DISTRIBUTION AND ECOLOGICAL GROUPS OF FUNGI														
Topic 1. Geographic distribution of fungi		14	4		5		5	14	1					13
Topic 2. Ecological groups of fungi		26	6		10		10	26						26
Total for module 3		40	10		15		15	40	1					39
Module 4. PROPAGATION OF FUNGI														
Topic 1. Vegetative reproduction of fungi		10	4		3		3	10	1					9
Topic 2. Reproductive		10	4		3		3	10						10

reproduction of fungi												
Topic 3. Asexual reproduction of fungi		10	4		3		3	10				10
Topic 4. Reproduction of fungi (Ascomycota division)		10	4		3		3	10				10
Topic 5. Reproduction of fungi (Basidiomycota division)		10	4		3		3	10				10
Total for module 2		50	20		15		15	50	1			49
Total hours		180	60		60		60		4			176
Course project (work) <hr/> (if included in the curriculum)												
			-	-	-		-		-	-	-	-
Total hours												

2. Topics of lectures

No.	Topic	Hours
1	Introduction to mycology	6
2	Mycelium and its modifications	6
3	Fungi as a component of the vegetative body of lichens	2
4	Fungal nutrition	4
5	Fungal metabolism	4
6	Biologically active compounds of fungi	8
7	Geographical distribution of fungi	4
8	Ecological groups of fungi	6
9	Vegetative reproduction in fungi	4
10	Reproductive strategies of fungi	4
11	Asexual reproduction of fungi	4
12	Reproduction of fungi (Ascomycota division)	4
13	Reproduction of fungi (Basidiomycota division)	4

3. Topic of laboratory (practical, seminars) classes

№	Topic title	Hours
1	Microscopic study of fungal cells. Methods of staining the constituent parts of the cell.	2
2	Study of the morphological structure of the hypha of the fungus. Types of hyphal branching. Vegetative body in	2
3	yeast fungi.	2
4	Mycelium structure. Fungal colony. Septated and non-septated mycelium. Morphological structure of appressoria, haustoria and anastomoses, clamp connections and pear-shaped swellings.	2
5	Resting stages of fungi: oidia, chlamydospores, hemes, films, cords, rhizoctonia, rhizomorphs, sclerotia, their morphological and microscopic structure.	2
6	Morphological structure of lichens.	2
7	Laboratory utensils, tools, equipment for laboratory research	2

8	Nutrient media, their components. Preparation and sterilization conditions.	2
9	Cultivation of fungi (influence of temperature and humidity).	2
10	The concept of "pure culture". Sowing methods for obtaining "pure cultures" of fungi.	2
11	Fungi growth, growth phases. Determination of fungal growth.	2
12	Study of the activity of fungal enzymes.	2
13	Study of antibiotic properties of fungi.	2
14	Study of toxin-forming fungi.	2
15	Study of the activity of volatile metabolites of fungi.	2
16	Study of non-volatile metabolites of fungi	2
17	Study of antagonistic properties of fungi	2
18	Soil fungi, methods of their isolation.	2
19	Identification of species isolated from soil.	2
20	Air fungi, water fungi, methods of their isolation.	2
21	Identification of species isolated from air and water.	2
22	Phytopathogenic fungi, methods of their isolation.	4
23	Methods of identifying species of fungi that cause plant diseases.	1
24	Fungi that cause mycosis and mycotoxicosis. Research and identification methods.	2
25	Endo- and exogenous method of spore formation during asexual reproduction.	4
26	Sexual reproduction of lower fungi. Planogamy Zyogamy Oogamy	2
27	Reproduction of marsupial mushrooms. Formation of bags and ascospores.	2
28	Yeast reproduction	1
29	Fruit bodies of marsupial mushrooms.	2
30	Reproduction of basidial fungi. Basidia, its structure	2
Total		60

4. Topics of self-study

No s/n	Topic title	Hours
1	Morphological diversity of fungal spores.	10
2	Influence of the substrate on the branching and formation of mycelial changes.	10
3	Symbiosis of fungi and algae, features of development and existence	5
4	Fungi are objects of biotechnology	10
5	Fungi are objects of the food industry	10
6	The role of fungal organisms in crop production	10
7	Fundamental and molecular methods in mycology.	5
Total		60

5. Methods of assessing expected learning outcomes:

(select necessary or add)

- oral or written survey;
- interview;
- test;
- defending laboratory/practical, design/graphical works, projects;
- peer-to-peer assessment, self-assessment.

6. Teaching methods (*select necessary or add*):

- problem-based method;
- practice oriented studying method;
- case method;
- project education method;
- flipped classroom, mixed education method;
- research based method;
- learning discussions and debates method;
- team work, brainstorm method

7. 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
<i>Module 1. STRUCTURE OF FUNGI</i>		
Laboratory work 1.	Correctly apply appropriate methods of observation, description, identification, classification, and cultivation of agrobiocenosis objects, as well as methods for maintaining their stability to preserve natural biodiversity.	12
Laboratory work 2.		12
Laboratory work 3.		12
Laboratory work 4.		12
Laboratory work 5.		12
Self-study 1.	To know the main historical stages of the development of the subject area.	10
Module control work 1.		30
Total for module 1		100
<i>Module 2. BIOCHEMICAL PROPERTIES OF FUNGI</i>		
Laboratory work 1.	Correctly apply appropriate methods of observation, description, identification, classification, and cultivation of agrobiocenosis objects, as well as methods for maintaining their stability to preserve natural biodiversity.	7
Laboratory work 2.		7
Laboratory work 3.		7
Laboratory work 4.		7
Laboratory work 5.		7
Self-study 1.	To know the main historical stages of the development of the subject area.	5
Laboratory work 1.		7
Laboratory work 2.		7
Laboratory work 3.		7
Laboratory work 4.		7
Laboratory work 5.		7
Self-study 2.		5
Module control work 2.		30
Total for module 1		100
<i>Module 3. GEOGRAPHICAL DISTRIBUTION AND ECOLOGICAL GROUPS OF FUNGI</i>		
Laboratory work 1.	Correctly apply appropriate methods of observation, description, identification, classification, and cultivation of agrobiocenosis objects, as well as methods for maintaining their stability to preserve natural biodiversity.	10
Laboratory work 2.		10
Laboratory work 3.		10
Laboratory work 4.		10
Laboratory work 5.		10
Laboratory work 6.	To know the main historical stages of the	5
Laboratory work 7.		5

Laboratory work 8.	development of the subject area.	5
Self-study		5
Module control work 3.		30
Total for module 1		100
<i>Module 4. PROPAGATION OF FUNGI</i>		
Laboratory work 1.	Correctly apply appropriate methods of observation, description, identification, classification, and cultivation of agrobiocenosis objects, as well as methods for maintaining their stability to preserve natural biodiversity. To know the main historical stages of the development of the subject area.	10
Laboratory work 2.		10
Laboratory work 3.		10
Laboratory work 4.		10
Laboratory work 5.		10
Laboratory work 6.		8
Laboratory work 7.		8
Self-study 5.		2
Self-study 6.		2
Module control work 4.		30
Total for module 2		100
Class work	$(M1 + M2)/2 * 0,7 \leq 70$	
Exam/credit	30	
Total for year	$(\text{Class work} + \text{exam}) \leq 100$	
Course project/work (if any)		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	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
Academic integrity rules	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	Attendance is compulsory. For good reasons (e.g. illness, international internship), training can take place individually (online by the faculty dean's consent)

8. Teaching and learning aids:

- e-learning course of the discipline
<https://elearn.nubip.edu.ua/course/view.php?id=3104>
- references to digital educational resources:
 - <https://www.indexfungorum.org/names/names.asp> ;
 - <http://www.cybertruffle.org.uk/>
 - <http://www.ascofrance.com/>
 - <http://www.forestryimages.org/pests.cfm6>

- <http://www.mycobank.org>
- <http://pyrenomycetes.free.fr/>
- <https://mycolog.com/index.htmltextbooks> ;
- guidelines for studying a discipline by full-time and part-time students;
- internship programmes of the discipline (if included in the curriculum).

9. Recommended sources of information

1. American Phytopathological Society (APS). Available at: <https://www.apsnet.org>
2. British Mycological Society (BMS). Available at: <https://www.britmycolsoc.org.uk>
3. CAB Abstracts Database. Available at: <https://www.cabi.org>
4. Fungal Biology Journal (Elsevier). Available at: <https://www.sciencedirect.com/journal/fungal-biology>
5. Index Fungorum. Available at: <https://www.indexfungorum.org>
6. Journal of Fungi (MDPI). Available at: <https://www.mdpi.com/journal/jof>
7. MycoBank Database. Available at: <https://www.mycobank.org>
8. National Center for Biotechnology Information (NCBI). Available at: <https://www.ncbi.nlm.nih.gov>
9. SpringerLink – Mycology Collection. Available at: <https://link.springer.com>

10. Recommended Literature

1. Antonyak, H. L., Kalynets-Mamchur, Z. I., Dudka, I. O., Babych, N. O., & Panas, N. E. (2013). *Ecology of Mushrooms*. Lviv. 628 p.
2. Bunyard, B. A. (2022). *The Lives of Fungi: A Natural History of Our Planet's Decomposers*. Princeton, NJ: Princeton University Press. 288 p.
3. Chander, J. (2023). *Textbook of Medical Mycology* (4th ed.). New Delhi: Jaypee Brothers Medical Publishers. 946 p.
4. Hsueh, Y.-P., & Blackwell, M. (Eds.). (2024). *Fungal Associations* (3rd ed.). In *The Mycota* (Vol. IX). Cham: Springer Nature.
5. Norflus, F. (2021). Using Open Resources to Teach Mycology. *The American Biology Teacher*, 83(8), 504–512.
6. Nowrousian, M., & Stajich, J. E. (Eds.). (2024). *Fungal Genomics* (3rd ed.). In *The Mycota* (Vol. XIII). Cham: Springer Nature
7. Pöggeler, S., & James, T. Y. (Eds.). (2023). *Evolution of Fungi and Fungal-Like Organisms* (2nd ed.). Cham: Springer Nature. 322 p.
8. Watkinson, S. C., Boddy, L., & Money, N. P. (2015). *The Fungi* (3rd ed.). London: Academic Press. 452 p.