

NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE
V.F. Peresyphkin Department of Phytopathology

APPROVED
by the Dean of the Faculty Plant Protection,
Biotechnologies and Ecology
"21" may 2025

WORK PROGRAM OF THE ACADEMIC DISCIPLINE
“GENERAL PLANT PATHOLOGY”

Field of knowledge H Agriculture, forestry, fisheries and veterinary science

Specialty H1 Agronomy

Academic program Protection and quarantine

Faculty of Plant Protection, Biotechnology and Ecology

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Description of the discipline “General Plant Pathology”

"General phytopathology" is one of the main profiling disciplines in the training of a specialist in plant protection and quarantine. It has a close connection with many general biological and special disciplines: botany, plant physiology, microbiology, virology, biotechnology, soil science, general agriculture, plant breeding, breeding and seed production, fruit growing, vegetable growing, agrochemistry, mycology, agricultural phytopathology, zoology, general and agricultural entomology, etc., which is due to common objects and methods of research.

Academic degree, specialty, academic programme		
Academic degree	bachelor's	
Specialty	202 Plant Protection and Quarantine	
Academic programme	Plant Protection and Quarantine	
Characteristics of the discipline		
Type	compulsory	
Total number of hours	240	
Number of ECTS credits	8	
Number of modules	4	
Course project (work) (if any)	CW	
Form of assessment	exam / credit	
Indicators of the discipline for full-time and part-time forms of university study		
	Full-time	Part-time
Year of study	3	4
Semester	5,6	6,7
Lectures	60 h.	2 h.
Practical classes and seminars	-	-
Laboratory classes	90 h.	-
Self-study	90 h.	238 h.
Number of hours per week for full-time students	6 h.	

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

"General plant pathology" is one of the main profiling disciplines in training a specialist in plant protection and quarantine. It has a close connection with many general biological and special disciplines: botany, plant physiology, microbiology, virology, biotechnology, soil science, general agriculture, plant breeding, selection and seed production, fruit growing, vegetable growing, agrochemistry, mycology, agricultural phytopathology, zoology, general and agricultural entomology, etc., due to common objects and research methods.

The goal of general phytopathology as a science is to study the pathological process of plants, the etiology of diseases, the role of biotic and abiotic factors in their appearance and development, and to find out the factors that restrain the spread of pathogens and the diseases they cause.

During the implementation of the program, students study various groups of

microorganisms pathogenic to plants, their parasitic properties, specialization and systematic position.

The task of general phytopathology is:

- To acquaint students with the pathological process in a plant,
- To study the reasons for the regularity of the spread and development of plant diseases and to be able to establish the influence of environmental factors on these phenomena
- Master the classic and modern methods of diagnosing plant diseases with subsequent identification of their causative agents;
- Based on signs of manifestations on the plant, establish the etiology of the disease;
- Be able to plan and develop preventive and curative measures to prevent plant diseases and reduce crop losses from diseases

As a result of studying general phytopathology, the student should:

to know the diagnostic signs and types of diseases, methods of identification of pathogens, having mastered the theoretical issues of their biology, ecology, systematics and ways of spreading;

to be able to independently determine the types of diseases, establish their causative agents and taxonomic groups, justify measures that prevent the appearance of epiphytotia and limit the development of diseases caused by them.

-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.

-Special (professional, subject) competencies (SC):

SC 1. Ability to conduct phytosanitary diagnostics of plant diseases, insects, mites, nematodes, rodents and weeds using the latest principles and methods.

SC 4. Ability to detect, localize and eliminate regulated harmful organisms based on the results of inspection and phytosanitary examination.

Program Learning Outcomes (PLO)

PLO 6. Correctly use appropriate methods of observation, description, identification, classification, cultivation of objects of agrobiocenoses and maintenance of their stability in order to preserve natural diversity.

PLO 16. Know the main historical stages of development of the subject area.

2. The program and structure of the academic discipline for:

– full-time full-time (correspondence) form of education; – reduced period of full-time (correspondence) education.

Titles of modules and themes	Amount of hours											
	Full time, hrs.						External, hrs.					
	total	including					total	including				
		l	p	lab	ind.	indiv.w.		l	p	lab	ind.	indiv.w
Module 1. The concept of plant diseases												
Introduction	1	1					1	1				
Topic 1. The history of the development of phytopathology	7	3				4						6
Topic 2. Pathological process and its variability	7	1		2		4						7
Topic 3. Harmfulness of plant diseases	5	1		2		2						5
Topic 4. Classification of plant diseases	9	1		4		4						9
Topic 5. Types of plant diseases	9	1		4		4						9
Topic 6. Non-infectious plant diseases	12	4		4		4						12
Topic 7. Infectious diseases	12	4		4		4						12
Together according to the content module 1	62	16		20		26	62	2				60
Module 2. Pathogens of plant diseases												
Topic 8. Properties of pathogens that determine disease-causing processes in plants	8	2		2		4	8	1				7
Topic 9. Bacteria and actinomycetes, mycoplasmas and rickettsia	10	2		4		4	10					10
Topic 10. Viruses and viroids	10	2		4		4	10					10
Topic 11. Flower parasites	8	2		2		4	8					8
Topic 12. Morphological, biological and pathogenic properties of lower fungi, their taxonomy.	22	6		12		4	22					22
Together according to the content module 2	58	14		24		20	58					58
Module 3. Dynamics of development and spread of infectious plant diseases												
Topic 13. Morphological, biological and pathogenic properties of higher fungi, their taxonomy	28	12		12		4	28	1				27
Topic 14. Penetration of pathogens into the plant	10	2		4		4	10					10
Topic 15. The influence of environmental conditions on infection	10	2		4		4	10					10
Topic 16. Ways and methods of spread of the infectious beginning	8	2		2		4	8					8
Topic 17. The concept of areas and epiphytotypic diseases	8	2		2		4	8					8
Together according to the content module 3	64	20		24		20	64	2				62
Module 4. Plant disease diagnostics. Principles of constructing protective measures												
Topic 18. Methods of diagnosing plant diseases. Molecular diagnostic methods.	14	2		8		4	14	1				14
Topic 19. Methods and means of protecting plants from diseases:												
Topic 20. Compliance with agrotechnical requirements for growing plants	7	1		2		4	7					7
Topic 21. Immunological method of plant protection	5	1		2		2	5					5
Topic 22. Biological method	10	2		4		4	10					10
Topic 23. Physico-mechanical method	5	1		2		2	5					5
Topic 24. Chemical method	8	2		2		4	8					8
Topic 25. Quarantine measures	7	1		2		4	7					7
Together according to the content module 4	56	10		22		24	56					56
Total hours	240	60		90		90	240	4				238
Course project (work) on General Plant Pathology		-	-	-		-		-	-	-		-
Total hours		-	-	-		-		-	-	-		-

3. Topics of laboratory classes

№	Topic name	Hours
1	Discoloration of the material, coloring and fixation of preparations. Infection of plants with pathogens. Observation of the development of a living object and pathological changes in a plant.	4
2	Determining the harmfulness of diseases by their symptoms and distribution.	2
3	Acquaintance with visual signs of diseases according to their classification.	4
4	Symptoms of diseases. Types, their manifestation	4
5	Acquaintance with the symptoms of diseases arising under the influence of abiotic factors.	4
6	External signs of damage to plant organs by pathogens belonging to different groups of parasitism.	2
7	The ability of pathogens to infect certain types of plants. The role of minimal infectious load in the occurrence of infection.	2
8	Morphological features of phytopathogenic bacteria. Types of bacterial plant diseases. Staining of phytopathogenic bacteria, fixation, artificial infection of plants.	4
9	Morphological properties of actinomycetes, rickettsial mycoplasmas.	2
10	Symptoms of viral plant diseases. Determining whether the latter belong to the groups of mosaics and yellows. Artificial infection of healthy plants with viral pathogens as evidence of disease infectivity. Diagnosis of plant viral diseases.	2
11	Morphological features of viroids.	2
12	Symptoms of mistletoe, coryza and lupus. Mechanism of plant infection.	2
13	Sensitivity of lower fungi to abiotic factors. Antagonism of fungi within the species and relative to other organisms. Fundamentals of mushroom taxonomy. The principles of dividing them into taxonomic groups. Class Plasmodiophoromycetes.	2
14	Principles of dividing them into taxonomic groups Class Chytridiomycetes.	6
15	The principles of dividing them into taxonomic groups Class Oomycetes.	2
16	The principles of dividing them into taxonomic groups Class Zygomycetes.	2
17	Signs of mycelium according to which mushrooms belong to higher ones. Penetration into the plant.	6
18	Systematics of higher fungi. Class Ascomycetes	6
19	Systematics of higher fungi. Class Basidiomycetes	4
20	Systematics of higher fungi. Mitosporous fungi	2
21	Infection of plants with pathogens under different regimes of temperature, moisture and presence of light.	2
22	Direct and passive transmission of pathogens from diseased plants or their individual organs to healthy ones.	2
23	Emergence of epiphytobia under different conditions of meteorological condition, pathogen and resistance of varieties (simulate these factors and predict epiphytobia).	6
24	Methods of diagnosing plant diseases. Laboratory methods of diagnosis	4
25	Molecular diagnostic methods	2
26	Simulate various agrotechnical backgrounds affecting the development of certain groups of diseases.	2
27	The role of the variety in the development of plant diseases. Specify the varieties with increased resistance of various agricultural crops against diseases.	2
28	The influence of fungi of the second order and their producers on the growth and development of phytopathogenic fungi.	2
29	Determining the quality of infected and healthy seeds as proof of the need to clean them. Methods of thermal disinfection of seeds.	2
30	The influence of chemical plant protection agents on the germination of spores and the development of mycelia of pathogens.	2
Total		905

4. Topics of independent studies

From Module № 1 "Concepts about plant diseases"

№	Topic name	Hours
1	Determination of harmfulness of diseases	5
2	Symptoms of diseases by etiology	5
3	Types of disease manifestations	5
4	Acquaintance with the symptoms of diseases arising under the influence of abiotic factors	5
5	External signs of damage to plant organs by pathogens belonging to different groups of parasitism	6
Total		26

From Module №2 "Pathogens of plant diseases"

№	Topic name	Hours
1	The ability of pathogens to infect certain types of plants. The role of minimal infectious load in the occurrence of infection.	4
2	Morphological features of phytopathogenic bacteria. Types of bacterial plant diseases. Staining of phytopathogenic bacteria, fixation, artificial infection of plants. Morphological properties of actinomycetes, rickettsial mycoplasmas.	4
3	Symptoms of viral plant diseases. Determining whether the latter belong to the groups of mosaics and yellows. Artificial infection of healthy plants with viral pathogens as evidence of disease infectivity. Diagnosis of plant viral diseases.	4
4	Morphological features of viroids.	4
5	Floral parasites of plants. Mechanism of plant infection.	4
Total		20

From Module № 3 "Dynamics of Development and Spread of Infectious Plant Diseases"

№	Topic name	Hours
1	Signs of mycelium according to which mushrooms belong to higher ones. Penetration into the plant.	2
2	Systematics of higher fungi. Class Ascomycetes	2
3	Systematics of higher fungi. Class Basidiomycetes	2
4	Systematics of higher fungi. Mitosporous fungi	2
5	Infection of plants with pathogens under different regimes of temperature, moisture and presence of light.	2
6	Direct and passive transmission of pathogens from diseased plants or their individual organs to healthy ones.	5
7	Emergence of epiphytotia under different conditions of meteorological condition, pathogen and resistance of varieties (simulate these factors and predict epiphytotia).	5
Total		20

From Module № 4 "Diagnosis of plant diseases. Principles of construction of protective measures"

№	Topic name	Hours
1	Methods of diagnosing plant diseases. Laboratory methods of diagnosis	10
2	Molecular diagnostic methods	8
3	Methods and means of protecting plants from diseases	6
Total		24

5. Tools for assessing expected learning outcomes: *(select necessary or add)*

- exam;
- credit;
- module tests;
- abstracts;
- presentation of laboratory and practical works;
- other types.

6. Teaching methods:

- verbal method (lecture, discussion);
- practical method (laboratory, practical classes);
- visual method (illustration, demonstration);
- processing learning resources (note-taking, summarising, reviewing, writing an abstract);
- video method (remote, multimedia, web-based, etc.);
- self-study (completing assignments);
- individual research work;
- other types.

7. Assessment methods: *(select necessary or add)*

- exam;
- credit;
- oral or written assessment;
- module tests;
- team projects;
- 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*.

8.2. Scale for assessing student's knowledge

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

8.1.Distribution of points by types of educational activities

Educational activity	Results	Assesment
Module 1. The concept of plant diseases		
Laboratory work 1	GC 3. Knowledge and understanding of the subject area and understanding of professional activity. SC 1. Ability to conduct phytosanitary diagnostics of plant diseases, insects, mites, nematodes, rodents and weeds using the latest principles and methods.	10
Laboratory work 2		10
Laboratory work 3		10
Laboratory work 4		10
Laboratory work 5		10
Laboratory work 6		10
Self-study 1		10
Modular test work 1		30
Total for module 1		100
Module 2. Pathogens of plant diseases		
Laboratory work 7	GC 2. Ability to apply knowledge in practical situations.	5
Laboratory work 8	GC 3. Knowledge and understanding of the subject area and understanding of professional activity.	5
Laboratory work 9		5
Laboratory work 10	SC 1. Ability to conduct phytosanitary diagnostics of plant diseases, insects, mites, nematodes, rodents and weeds using the latest principles and methods.	5
Laboratory work 11		5
Laboratory work 12		5
Laboratory work 13	SC 4. Ability to detect, localize and eliminate regulated harmful organisms based on the results of inspection and phytosanitary examination	10
Laboratory work 14		10
Laboratory work 15		10
Self-study 2		10
Modular test work 2		30
Total for module 2		100
Module 3. Dynamics of development and spread of infectious plant diseases		
Laboratory work 16	GC 2. Ability to apply knowledge in practical situations.	5
Laboratory work 17	GC 3. Knowledge and understanding of the subject area and understanding of professional activity.	10
Laboratory work 18		10
Laboratory work 19	SC 1. Ability to conduct phytosanitary diagnostics of plant diseases, insects, mites, nematodes, rodents and weeds using the latest principles and methods.	10
Laboratory work 20		10
Laboratory work 21		5
Laboratory work 22	SC 4. Ability to detect, localize and eliminate regulated harmful organisms based on the results of inspection and phytosanitary examination.	10
Self-study 3		10
Modular test work 3		30
Total for module 3		100
Module 4. Plant disease diagnostics. Principles of constructing protective measures		
Laboratory work 23	GC 2. Ability to apply knowledge in practical situations.	7
Laboratory work 24	GC 3. Knowledge and understanding of the subject area and understanding of professional activity.	8
Laboratory work 25		7
Laboratory work 26	SC 1. Ability to conduct phytosanitary diagnostics of plant diseases, insects, mites, nematodes, rodents and weeds using the latest principles and methods.	8
Laboratory work 27		5
Laboratory work 28		8
Laboratory work 29	SC 4. Ability to detect, localize and eliminate regulated harmful organisms based on the results of inspection and phytosanitary examination.	7
Laboratory work 30		8
Self-study 4		5

Module control work 4	PLO 6. Correctly use appropriate methods of observation, description, identification, classification, cultivation of objects of agrobiocenoses and maintenance of their stability in order to preserve natural diversity. PLO 16. Know the main historical stages of development of the subject area.	7
Total for module 4		100
Academic work	$(M1 + M2 + M3 + M4) / 2 \cdot 0,7 \leq 70$	
Exam/credit	30	
Total for year	$(\text{Academic work} + \text{exam}) \leq 100$	

8.3. Assessment policy

<i>Deadlines and exam retaking rules</i>	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
<i>Academic integrity rules</i>	Cheating during tests and exams is prohibited (including using mobile devices). Term papers and essays must have correct references to the literature used
<i>Attendance rules</i>	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=3039>);
- lectures and presentations (in electronic form);
- 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).

10. Recommended sources of information

1. Bashta O.V., Voloshchuk N.M., Vuyek A.O., Gentosh D.T., Pikovsky M.Y., Artemchuk I.P. Methodological recommendations for educational practice in phytopathology for applicants of the first (bachelor) level of higher education, specialty 202 Protection and quarantine of plants Kyiv: Editorial and publishing department of NUBiP of Ukraine. 2023. 78 pages.

2. Bashta O.V., Vuyek A.O. Workbook for performing laboratory work in General Phytopathology for students of the first (bachelor) level of higher education, specialty 202 Protection and quarantine of plants. Kyiv: Editorial and publishing department of NUBiP of Ukraine. 2023. 128 pages.

3. Bashta O.V., Voloshchuk N.M. Methodical guidelines for writing a coursework on general phytopathology for students of the BA "Bachelor" specialty 202 "Protection and Quarantine of Plants". Kyiv: Editorial and publishing department of NUBiP of Ukraine. 2022. 12 p.

4. Bashta O.V., Voloshchuk N.M., Vuyek A.O. Methodical instructions for laboratory work on general phytopathology for students of the BA "Bachelor"

specialty 202 "Protection and Quarantine of Plants". Kyiv: Editorial and publishing department of NUBiP of Ukraine. 2022. 95 p.

5. Bhunjun C.S.; Phillips A.J.L.; Jayawardena R.S.; Promputtha I.; Hyde K.D. Importance of Molecular Data to Identify Fungal Plant Pathogens and Guidelines for Pathogenicity Testing Based on Koch's Postulates. *Pathogens* 2021. 10. 1096. <https://doi.org/10.3390/pathogens10091096>

6. Mapuranga J, Zhang N, Zhang L, Chang J, Yang W. Infection Strategies and Pathogenicity of Biotrophic Plant Fungal Pathogens. *Front Microbiol.* 2022 Jun 2;13:799396. doi: 10.3389/fmicb.2022.799396.

7. Modern Approaches in Plant Pathology. Elite Publishing House. 2023. 321 pp.
Principles of Plant Pathology. Mishra R. C. & Singh R. (eds.). 2023. 19 pp. <https://www.researchgate.net/publication/370025309>

8. Plant Pathology Concepts and Laboratory Exercises Third edition. – CRC Press. – 2016. – 598 p.

9. The Study of Plant Disease Epidemics. [Laurence V. Madden](#), [Gareth Hughes](#), and [Frank van den Bosch](#), 2017 <https://doi.org/10.1094/9780890545058>

10. Venbrux M, Crauwels S and Rediers H. Current and emerging trends in techniques for plant pathogen detection. *Front. Plant Sci.* 2023. 14:1120968. doi: 10.3389/fpls.2023.1120968

11. Phytopathology: Textbook [I.L. Markov, O.V. Bashta, D.T. Gentosh, V. A. Glymyazny, O.P. Dermenko, E. P. Chernenko]; under the editorship I.L. Markov. K., 2016. 548 p. 2.

12. General phytopathology: Education. manual / Under the editorship N.V. Pinchuk: -. Vinnytsia, 2018. – 272 p.

Internet resources:

1. European Journal of Plant Pathology
<https://www.springer.com/journal/10658/>

2. Atlas of ornamental plant diseases. Access:

<https://naurok.com.ua/atlas-hvorob-dekorativnih-roslin-320421.html>

3. Identifier of plant pests and diseases. KWS. Access: www.kws.com/ua/uk/agroservis/vyroshchuvannya-roslyn/zahyst-roslyn/vyznachnyk-shkidnykiv-ta-hvorob/

4. TOP-5 applications for diagnosing plant diseases. Access: <https://superagronom.com/news/5925-top-5-dodatkov-dlya-dagnostiki-hvorob-roslin>

5. Diseases and pests of indoor plants. Access: <https://asterias.od.ua/860-khvorobi-ta-shkidniki-kimnatnikh-roslin-zakhist-i-likuvannya.html>