

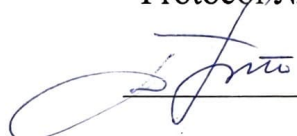
**NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL
SCIENCES OF UKRAINE**

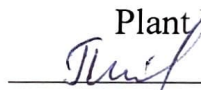
V.F. Peresyphkin Department of Phytopathology

“APPROVED”
Dean of the Faculty of Plant Protection,
Biotechnologies and Ecology

Yulia KOLOMIETS
“18” May 2023



“APPROVED”
V.F. Peresyphkin Department of Phytopathology
Protocol № 10 from “18th” April 2023

Head of the Department
Dmytro GENTOSH

“CONSIDERED”
Guarantor of education program
Plant Protection and Quarantine

Myroslav PIKOVSKYI

**WORKING EDUCATIONAL PROGRAM OF ACADEMIC DISCIPLINE
“AGRICULTURAL PLANT PATHOLOGY”**

Specialty	202-Plant Protection and Quarantine
Educational program	Plant Protection and Quarantine
Faculty	Plant Protection, Biotechnologies and Ecology
Developed by	Voloshchuk N.M., associate professor, Dr. PhD

KYIV – 2023

1. Description of Discipline
“Agricultural Plant Pathology”

Field of knowledge, direction of training, specialty, educational and qualification level				
Field of knowledge	<i>20 Agricultural sciences and food</i>			
Educational degree	<i>First (undergraduate)</i>			
Specialty	<i>202 Protection and quarantine of plants</i>			
Educational program	<i>Plant protection and quarantine</i>			
Characteristics of the academic discipline				
Kind	Mandatory			
Total hours	240			
Number of ECTS credits	8,0			
Number of content modules	4			
Course project (work)	Course work			
Final control form	Credit; Exam			
Indicators of academic discipline for full-time and part-time forms of education				
	Full-time education		External form of education	
Year of training (course)	4	4	4	5
Semester	7	8	8	9
Lecture classes	30 h	30 h	2 h	2 h
Practical, seminar classes	-	-		-
Laboratory classes	30 h	30 h		
Independent work	60 h	60 h	118 h	118 h
Individual tasks	-	-	-	-
Number of classroom hours per week	4 h	4 h		

2. Purpose, tasks and competencies of the educational discipline

The purpose of the discipline "Agricultural Plant Pathology" is to study diseases of agricultural crops, the species composition of pathogens and areas of their harmfulness, diagnostic signs of the manifestation of diseases on various plant organs, the influence of biotic and abiotic factors of the environment on the development of pathologies, sources and places of reservation of infection, measures to protect against certain diseases and systems of measures against diseases of a specific culture.

Task: studying the spread, symptoms, and harmfulness of diseases of the following groups of crops: grain cereals, grain legumes, annual and perennial leguminous grasses, sorghum, oilseeds, root crops, tubers, vegetables, fruits, berries, and grapes;

Study of the species composition of pathogens of various agricultural crops, their morphological and biological features;

Study of the influence of biotic and abiotic environmental factors on the development of plant diseases;

Clarification of sources and places of reservation of infectious material of pathogens;

Development and substantiation of preventive and therapeutic measures at a high professional level.

As a result of studying the academic discipline, the student should

to know: tasks, goals and objects of agricultural phytopathology; diagnostic signs of diseases on agricultural crops; morphological, biological and ecological features of pathogens; places of reservation and storage of infection; areas of spread of diseases and the extent of crop losses of agricultural plants; substantiation of protective measures against diseases on each agricultural crop;

to be able to: independently determine the most common and harmful diseases of various etiologies on agricultural crops by diagnostic signs; to identify the causative agents of diseases by morphological signs; to predict the development of diseases depending on weather conditions; plan and carry out agrotechnical, seed selection, chemical and biological plant protection measures; justify the expediency of using chemical and biological means of plant protection against diseases depending on the phytosanitary state of crops; to select and introduce regional disease-resistant varieties and hybrids of agricultural crops for the conditions of a specific farm.

Competence acquisition:

Integral competence:

The ability to solve complex specialized tasks and practical problems of professional activity in plant protection and quarantine and applied 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 9. Ability to make informed decisions.

Professional (special) competences (PC):

PC 1. The ability to carry out phytosanitary diagnostics of plant diseases, insects, mites, nematodes, rodents and weeds according to the latest principles and methods.

PC 5. Ability to develop and apply plant protection technologies at agricultural and other facilities.

PC 7. The ability to coordinate phytosanitary monitoring for the detection, identification and determination of the features of the biology and ecology of harmful organisms in Ukraine and in accordance with the WTO SPS agreement and the provisions of the legislation of the European Union.

PC 8. The ability to comprehensively apply methods for long-term regulation, development and spread of harmful organisms to an economically insignificant level based on the forecast, economic thresholds of harmfulness, the effectiveness of beneficial organisms, energy-saving and environmental protection technologies that ensure reliable protection of plants and ecological safety of the environment in accordance with the agreement WTO SPZ and provisions of legislation of the European Union.

PC 11. The ability to establish patterns of distribution and development of harmful organisms, to assess their seasonal and multi-year dynamics, to develop, scientifically justify and adapt a set of highly effective pest, disease and weed control measures under various environmental conditions.

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 7. Have basic knowledge of the basics of genetics, breeding and seed production, microbiology, plant physiology, ecology, soil science, agrochemistry, agriculture, crop production with the basics of fodder production to the extent necessary for mastering general and specialized professional disciplines

PLO 10. To train, control and evaluate the professional skills of workers involved in the implementation of plant protection and quarantine measures.

3. 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											
	total	Full time					total	External				
		including						including				
		l	p	lab	ind	Indiv. w.		l	p	lab	ind	Indiv. w.
Content module 1. Diseases of grain and leguminous crops												
Topic 1. Wheat protection system against diseases.	6	2		3		1	6	1				5
Topic 2. Barley protection system against diseases.	5	2		2		1	5					5
Topic 3. Rye diseases and the system of measures for their control	4			1		3	4					4
Topic 4. Oat diseases and the system of measures to control them	4			1		3	4					4
Topic 5. Corn protection system against diseases.	5	2		2		1	5					5
Topic 6. Rice diseases and the system of their control measures	4			1		3	4					4
Topic 7. Millet diseases and the system of measures to control them	4					4	4					4
Topic 8. Buckwheat diseases and the system of measures to control them	3	1				2	3					3
Topic 9. Diseases of sorghum, sudanka and cereal grasses. System of their control measures.	3	1				2	3					3
Topic 10. Pea diseases and the system of measures to control them	7	2		2		3	7					7
Topic 11. Soybean diseases and the system of measures to control them	6	2		2		2	6					6
Topic 12. Diseases of beans, fodder beans, lupine and vetch. System of their control measures	4	1		1		2	4					4
Topic 13. Diseases of perennial legumes	5	2				3	5					5
Together according to the content module 1	60	15		15		30	60	1				59
Content module II. Diseases of industrial crops												
Topic 1. Sunflower diseases and the system of measures to	10	3		3		4	10	1				9

control their development.												
Topic 2. Hemp diseases and measures to limit their development	5	1	1		3	5						5
Topic 3. Flax diseases and measures to limit their development	6	1	1		4	6						6
Topic 4. Diseases of castor beans and measures to limit their development	4	1			3	4						4
Topic 5. Rapeseed diseases and measures to limit their development	9	3	2		4	9						9
Topic 6. Tobacco and shaggy diseases. A system of measures to limit their development	8	2	2		4	8						8
Topic 7. Hop diseases and measures to limit their development	7	1	2		4	7						7
Topic 8. Beet diseases and measures to limit their development	11	3	4		4	11						11
Together according to the content module II	60	15	15		30	60	1					59
Course work												
Content module III. Diseases of potatoes and vegetable crops												
Topic 1. Potato diseases and the system of their control measures	13	3	4		6	13	1					12
Topic 2. Diseases of tomatoes and the system of their control measures	8	2	2		4	8						8
Topic 3. Diseases of cabbage vegetable crops and the system of measures for their control	8	2	2		4	8						8
Topic 4. Onion and garlic diseases and the system of measures to control them	8	2	2		4	8						8
Topic 5. Carrot diseases and the system of their control measures	8	2	2		4	8						8
Topic 6. Diseases of pumpkin crops and the system of measures to control them	8	2	2		4	8						8
Topic 7. Diseases of greens and the system of measures to control them	7	2	1		4	7						7
Together according to the content module III	60	15	15		30	60	1					59
Content module IV. Diseases of fruit and berry crops and grapes												
Topic 1. Diseases of seed fruit crops and the system of measures for their control	11	3	3		5	11	1					10
Topic 2. Diseases of stone fruit	10	2	3		5	10						10

crops and the system of their control measures											
Topic 3. Strawberry diseases and the system of measures to control them	8	2	2		4	4					4
Topic 4. Currant and Gooseberry diseases and the system of measures for their control	7	2	1		4	4					4
Topic 5. Raspberry and blueberry diseases and the system of their control measures	8	2	2		4	4					4
Topic 6. Diseases of grapes and the system of their control measures	9	2	3		4	4					4
Topic 7. Diseases of nuts and the system of their control measures	7	2	1		4	4					4
Together according to the content module IV	60	15	15		30	60	1				59
Total hours	240	60	60		120	240	4				236
Course work	15										

4. Topics of seminar classes (not provided)

N ^o	Topic name	Hours
1		
2		
...		

5. Topics of practical classes (not provided)

N ^o	Topic name	Hours
1		
2		
...		

6. Topics of laboratory classes

N ^o	Topic name	Hours
1.	Powdery mildew diseases of wheat	2
2.	Rusty diseases and root rot of wheat	2
3.	Other diseases of wheat	2
4.	Diseases of barley	2
5.	Rye and oat diseases	2
6.	Diseases of soybeans	2
7.	Diseases of peas	2
8.	Diseases of clover and alfalfa	2
9.	Sunflower diseases	2
10.	Flax diseases	2
11.	Rapeseed diseases	2

12.	Tobacco and pure tobacco diseases	2
13.	Diseases of hops	2
14.	Diseases of sugar beets	2
15.	Diseases of sugar beet roots	2
16.	Potato diseases	2
17.	Diseases of tomatoes	2
18.	Diseases of cabbage	2
19.	Diseases of onions and garlic	2
20.	Carrot diseases	2
21.	Cucumber diseases	2
22.	Diseases of green vegetables	2
23.	Diseases of seed fruit crops	2
24.	Diseases of stone fruit crops	2
25.	Strawberry diseases	2
26.	Currant diseases	2
27.	Raspberry diseases	2
28.	Blueberry diseases	2
29.	Diseases of grapes	2
30.	Diseases of walnut and hazelnut	2
Total		60

7. Topics of independent work

№	Topic name	Hours
1.	Oat protection system against diseases	2
2.	Rye protection system against diseases	2
3.	Rice diseases and the system of cultural protection measures	4
4.	Diseases of millet and the system of cultural protection measures	2
5.	Buckwheat diseases and the system of cultural protection measures	4
6.	Cereal grass diseases. Systems of protection measures	4
7.	Chickpea diseases. System of protection measures	2
8.	Diseases of beans. System of protection measures	4
9.	Diseases of fodder beans. Systems of protection measures	2
10.	Lupine diseases. System of protection measures	2
11.	Diseases of lentils and vetches. System of protection measures	2
12.	Systems of measures to protect clover and alfalfa from diseases	2
13.	Diseases of sainfoin. System of protection measures	2
14.	Flax protection system against diseases	9
15.	Disease protection system for tobacco and shag	9

16.	System of protection of hops from diseases	8
17.	Hemp diseases and protection system	9
18.	System of measures to protect cabbage vegetable crops from diseases	3
19.	A system of measures to protect onions and garlic from diseases	3
20.	System of measures to protect district crops from diseases	3
21.	System of measures to protect pumpkin crops from diseases	3
22.	System of measures to protect green vegetable crops from diseases	4
23.	System of strawberry disease control measures	3
24.	Currant disease control measures system	2
25.	Gooseberry diseases and the system of protection measures	2
26.	System of raspberry disease control measures	3
27.	A system of measures to protect walnuts from diseases	3
28.	A system of measures to protect hazelnuts from diseases	3
Total		120

8. Samples of control questions, tests to determine the level of knowledge acquisition by students.

1. Specify the symptoms of manifestation, causative agents, phases of plant infection, sources of infection of diseases of grain and leguminous crops.
2. Reveal the conditions affecting the damage of grain and leguminous crops by pathogens.
3. Systems of protection of grain and leguminous crops from diseases.
4. Regulation of seed material regarding the presence of rye ears in it.
5. The influence of environmental factors on the infection of rye by the causative agent of hornworms.
6. Agrotechnical measures that increase the resistance of rye plants against diseases.
7. What measures are taken to limit the development of snow mold?
8. Reveal the influence of fertilizers on the development of rye diseases.
9. Fungicides that limit the development of diseases during the growing season of the crop.
10. Name varieties with group resistance against the most common diseases.
11. Conditions causing the development of epiphytotic stem rust on oats.
12. The influence of agrotechnical measures on the development of oat powdery mildew.
13. Agrotechnical measures that limit the development of oat diseases.
14. Terms and conditions of using fungicides against oat diseases during the growing season.

15. Describe the role of agrotechnical measures in limiting rice diseases.
16. What factors affect the development of rice diseases?
17. How do sowing dates affect millet susceptibility to diseases?
18. Describe the measures that reduce damage to millet seeds by diseases.
19. Name the main sources of infections of buckwheat pathogens.
20. What agrotechnical measures limit the development of buckwheat diseases?
21. Describe the symptoms of the following sorghum and sudanka diseases: seed mold; sago (volatile, covered and finely bubbly); brown spots; nigrosporosis; cercosporosis; bacterial (bacterial stem rot, bacterial spotting, striped spotting); viral diseases.
22. Specify the sources of infection of fungal, bacterial and viral diseases of grain crops.
23. Name the factors contributing to the development of diseases of sorghum and sudanka.
24. Describe the set of agrotechnical measures that limit the spread and development of sorghum and sudanka diseases
25. List the sources of infection of fungal, bacterial and viral diseases of cereal grasses.
26. Specify the specialization of pathogens of cereal grasses. Охарактеризувати комплекс агротехнічних заходів, що обмежують поширення хвороб злакових трав.
27. Specify the sources of pea rust infection.
28. How does gray rot appear on pea plants?
29. Reveal the sources of infection of the causative agents of pea viral diseases.
30. What factors contribute to the development of powdery mildew of peas?
31. Name the sources of infection of causative agents of bean diseases.
32. What are the differences in the symptoms of white and gray rot on beans?
33. Specify the diseases, the causative agents of which can spread with affected seeds.
34. What factors influence the susceptibility of bean plants to pathogens?
35. To describe the diagnostic signs of fodder bean diseases.
36. Describe the environmental conditions that contribute to the development of fodder bean diseases.
37. Name a set of agrotechnical measures that limit the development of fodder bean diseases.
38. What pre-sowing seed preparation measures limit the development of lupine diseases?
39. Specify the sources of infection of vetch diseases.
40. To characterize the typical symptoms of the main diseases of clover.
41. Specify the sources of preservation of rust and powdery mildew infection of clover.
42. To characterize the main agrotechnical measures aimed at reducing the infectious onset in clover crops.
43. Features of protection of clover seeds from diseases.
44. Describe the symptoms of fungal and viral diseases of alfalfa.
45. Name the sources of preservation of rust and powdery mildew infection of alfalfa.

46. Name the sources of infection with the causative agents of asparagus diseases.
47. What are the differences in the symptoms of ascochytosis and septoriosiis?
48. What factors contribute to the mass development of safflower diseases?
49. Use of agrotechnical techniques to limit the development of safflower diseases.
50. Indicate the disease of carrot root crops, the symptoms of which are as follows: the affected tissue loses its firm consistency and the root crops rot, become slimy and turn into a mush-like mass.
51. Specify the conditions under which the epiphytotic development of downy mildew of onions occurs.
52. Carry out a visual diagnosis and indicate the name of the cucumber disease shown in the pictures. Розвитку звичайної парші картоплі сприяють.
53. The fungus *Synchytrium endobioticum* (Shillbere) Pervs. is the causative agent of the following disease.
54. To characterize the diagnostic signs of a hernia of cabbage.
55. Phytopathological weeding on potato seed plantings during the growing season is carried out in the following periods.
56. Alternariosiis of tomatoes manifests itself in the form.
57. Common potato scab is manifested in the form
58. Cabbage can increase the development of bacterial diseases.
59. Choose techniques that limit the development of potato diseases
60. Name the weeds that can be reservoirs of pathogens of cabbage diseases.
61. To reveal agrotechnical, seed selection, chemical and biological measures to control diseases of potatoes and vegetable crops.
62. Specify the periods of protective measures against diseases of vegetable crops and potatoes.
63. To characterize the influence of environmental factors on the development of cabbage diseases during the growing season of plants.
64. Symptoms of bacterial diseases of cabbage.
65. Features of protection of cabbage from diseases during the period of growing seedlings.
66. Name the sources of infection of fungal, bacterial and viral diseases of tomato.
67. Name the factors that contribute to the development of tomato diseases.
68. Describe the tomato protection system during the seedling growing period.
69. Reveal the essence of tomato plant vaccination and what problems it solves.
70. Describe the biological method of protecting tomatoes from diseases. Name biological preparations and the regulations for their use. Розкрити регламент застосування фунгіцидів на томаті у захищеному та відкритому ґрунті.
71. Identify diagnostic differences in the symptoms of carrot root diseases.
72. Name the factors contributing to the development of carrot diseases during the growing season and during storage of root crops.
73. What measures are used to control carrot diseases during the growing season?
74. Describe the set of measures to limit the damage of carrot seeds by pathogens.
75. Name the preventive measures that reduce damage to carrot root crops by diseases during storage.
76. Name the symptoms of false powdery mildew of a cucumber.

77. To characterize the signs of manifestation of the main viral diseases of cucumber.
78. Name the sources of infection with fungal diseases of cucumber.
79. Specify the sources of infection of viral diseases of cucumber.
80. Describe the conditions that promote the development of false powdery mildew of cucumber.
81. Features of protection of cucumber from diseases in conditions of protected soil.
82. Regulations for the use of fungicides on cucumbers in open ground.
83. Describe the symptoms of the main seasonal diseases of cherries and plums.
84. Name the main chronic diseases of peach and apricot.
85. Specify the sources of infection of fruit rot of stone crops.
86. Describe the factors that affect the development of diseases of stone fruit crops.
87. What is the prevention of diseases of stone fruit crops?
88. What agrotechnical measures limit the spread and development of stone fruit diseases?
89. Peculiarities and regulation of the use of pesticides in nurseries and orchards.
90. Measures to prevent the development of non-infectious diseases of stone fruit crops.
91. Describe the symptoms of grape downy mildew and oidium.
92. Name the sources of infection of grape diseases.
93. What factors influence the epiphytotic development of grape diseases?
94. Describe preventive measures against grape diseases.
95. Features of the use of fungicides on grapes.
96. Reveal the influence of environmental factors on the development of diseases of potatoes, vegetables, fruit and berry crops and grapes.
97. To characterize the symptoms and harmfulness of diseases of potatoes, vegetables, fruit and berry crops and grapes.
98. Biological features of pathogens of diseases of potatoes, vegetables, fruit and berry crops and grapes from diseases.
99. Sources of reservation of infection of pathogens of diseases of potatoes, vegetables, fruit and berry crops and grapes from diseases.
100. Integrated systems of protection of potatoes, vegetables, fruit and berry crops and grapes from diseases.

OF UKRAINE			
The first level of Higher Education (undergraduate) Specialty 202- Protection and quarantine of plants	V.F. Peresykin Phytopathology Department 2023-2024 academic year	EXAM TICKET № of discipline Agricultural Plant Pathology	Approved head of department _____ 2023p.
Exam questions			
1. Describe the factors affecting the susceptibility of winter wheat to pathogens (volatile and hard soot, septoriosiis, powdery mildew)			
2. Reveal the impact of agrotechnical measures to limit the development of sugar beet diseases.			
Test tasks of various types			

1. Name the intermediate host of the causative agent of pea rust:

2. The source of beet powdery mildew infection is:

1	Affected remains of winter wheat.
2	Conidia in soil.
3	Mycelium of the pathogen in the affected remains in the soil.
4	Cleistothecia of the fungus on the affected remains.

3. Specify the symptoms of rhynchosporosis of barley:

1	Dark velvety coating on stems, leaves, ears.
2	Oval brown spots with a pale yellow border, as well as longitudinal and transverse stripes.
3	The leaves have oval or irregular gray-green spots with a dark brown border.
4	White powdery coating on the leaves.

4. name the phase of growth and development of winter wheat when symptoms of flying soot appear:

5. Disinfection of sunflower seeds is carried out with the following poison:

1	Tilt, k.e.
2	Impact, 25% s.c.
3	Derosal, s.c.
4	Corbel, 75%, ec.

6. Name the powdery mildew disease of wheat, the causative agent of which infects plant seedlings in the soil during seed germination:

7. Alternariosis of rape manifests itself in the form of:

1	On the leaves and pods, the disease develops as gray dry spots, on the pods they are slightly depressed, often with concentric zonation and black pycnidia.
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2	Dark brown, almost black or light gray, rounded, zonal spots with a diameter of 1-15 mm with a black or gray coating appear on the leaves.
3	On the cotyledons and leaves of winter and spring rape in the form of brown-green, yellow, blurred spots, on the lower side of which a gray-purple coating appears.
4	Signs of the disease appear in wet weather in the form of brown, dehydrated areas of the tissue, which are covered with a gray loose coating.

8. The development of peronosporosis (false powdery mildew) of cucumbers is facilitated by:

1	Dry hot weather, which causes a decrease in the turgor of leaves in plants.
2	The air temperature is above +30 °C.
3	Weather with low relative humidity.
4	The presence of droplet-liquid moisture, or 100% relative humidity.

9. Specify the strawberry disease shown on the picture:



10. Choose chemical fungicides for spraying wheat plants against diseases during the growing season:

1	Kinto Duo, Vitavax 200 FF,
2	Karate, Decis.
3	Agate 25 K, Mykosan,
4	Tilt Turbo, Impact.

9. Teaching methods

When studying the discipline "Agricultural Phytopathology", students mainly use the method of ready-made knowledge in lectures, while in the laboratory - the research method. It is the latter that allows you to consolidate, generalize and systematize the acquired knowledge.

Depending on the origin of information, the following are distinguished: verbal, visual and practical methods; from the goal: methods of acquiring new knowledge, methods of forming skills and abilities, methods of applying knowledge in practice, methods of creative activity, methods of consolidating knowledge, abilities and skills, methods of testing and evaluating knowledge, abilities and skills. At lectures, we use presentations, because visualizing the material improves the level of perception. All other methods are also used.

According to the peculiarities of educational and cognitive activity of students, the following methods are used:

- explanatory-illustrative (informational-receptive) method: the teacher organizes perception and awareness of information, and students carry out perception (reception), understanding and memorization of it;
- reproductive: the teacher gives a task, in the process of which students acquire the ability to apply knowledge according to the model;
- problem-based implementation: the teacher formulates a problem and solves it, students monitor the progress of creative search (students are given a kind of standard of creative thinking);
- partially search (heuristic): the teacher formulates a problem, the step-by-step solution of which is carried out by students under his guidance (at the same time, there is a combination of reproductive and creative activity of students);
- research: the teacher poses a problem to the students, and they solve it independently, putting forward ideas, checking them, selecting the necessary sources of information, devices, materials, etc. for this.

10. Forms of control

Control of students' knowledge and skills (current and final) of the discipline "Agricultural Phytopathology" is carried out according to the credit-module system of organizing the educational process. The student's rating for mastering the discipline is determined on a 100-point scale. It consists of a rating for academic work, for the evaluation of which 70 points are assigned, and a rating for attestation (exam) - 30 points.

Criteria for assessing the level of knowledge in laboratory, seminar and practical classes. In laboratory classes, each student completes tasks. The level of knowledge is assessed as: "excellent" - the student gives comprehensive, well-founded, theoretically and practically correct answers to at least 90% of the questions, correct performance of laboratory work, demonstrates knowledge of the material of textbooks, study guides, reference books, makes generalizations and conclusions, neatly prepares assignments, was present at the lectures, has a synopsis of the lectures or essays on the main topics of the course; "good" - when the student has knowledge of the material, but makes minor mistakes in the formulation of individual tasks, but with the help of the teacher quickly finds his way around and finds the correct answers, attended lectures, has a synopsis of lectures or essays on the main topics of the course; "satisfactory" - when the student gives the correct answer to at least 60% of the questions, or gives insufficiently substantiated, incomplete answers to all questions, makes gross mistakes, which are corrected with the help of the teacher. At the same time, the availability of a synopsis on the topic of tasks and independence is taken into account; "unsatisfactory with the possibility of retaking" - when the student gives the correct answer to at least 35% of the questions, or gives unreasonable, incomplete answers to all questions, makes gross mistakes. It has an incomplete synopsis of lectures.

Final (general assessment) course of the academic discipline. It is the sum of ratings (points) obtained for separate evaluated forms of educational activity: current and final

testing of the level of mastery of theoretical material during classroom classes and independent work (modular control);

assessment (points) for performing laboratory studies. The final grade is issued after a full study of the academic discipline, which is derived as the sum of intermediate grades for the content modules. The final assessment of the level of knowledge consists of the rating for the academic work, for the assessment of which 70 points are assigned, and the rating for the attestation (test, exam) - 30 points.

11. Distribution of points received by students

The student's knowledge is assessed on a 100-point scale and translated into national assessments according to the table. 1 "Regulations on examinations and assessments at NUBiP of Ukraine" (order on implementation dated 04.26.2023, protocol No. 10)

Student rating, points	The assessment is national for the assembly results	
	exams	credits
90-100	excellent	credited
74-89	good	
60-73	satisfactory	
0-59	unsatisfactory	not credited

To determine the student's (student's) rating for mastering the **R_{dis}** discipline (up to 100 points), the obtained rating from the certification (up to 30 points) is added to the student's (student's) rating for the RPR educational work (up to 70 points):

$$R_{dis} = R_{EW} + R_{AT}$$

12. Educational and methodological support

Electronic educational course Agricultural phytopathology / Voloshchuk N.M.
website: URL:

<https://elearn.nubip.edu.ua/user/view.php?id=9598&course=3049>

1. Workbook for conducting laboratory work on the discipline

"Agricultural Phytopathology" for students of the specialty 202-protection and quarantine of plants. Part 1. Diseased legumes, legumes and industrial crops

/ editor: M.Y. Pikovsky, M.M. Kirik Kyiv: Editorial and Publishing Department of NUBiP of Ukraine, 2018. 183 p.

<http://dspace.nubip.edu.ua:8080/jspui/handle/123456789/6069>

2. Workbook for conducting laboratory work of the discipline "Agricultural Phytopathology" for students of the specialty 202-plant protection and quarantine. Part 2. Diseases of vegetable, fruit and berry crops and grapes / comp. M.Y. Pikovsky. Kyiv:

Editorial and Publishing Department of NUBiP of Ukraine, 2019. 124 p.
<http://dspace.nubip.edu.ua:8080/jspui/handle/123456789/6395>

3. Agricultural phytopathology. Methodical instructions for course work by students of the BA "Bachelor" specialty 202 "Protection and quarantine of plants" / comp.: M.Y. Pikovsky, D.T. Gentosh, N.M. Voloshchuk Kyiv: "CP KOMPRINT", 2022. 45 p.

4. Methodical recommendations for independent work on the discipline "Agricultural phytopathology" for first (bachelor's) students level of higher education, specialty 202 Protection and quarantine of plants / comp.: M.Y. Pikovsky. Kyiv: Editorial and publishing department of NUBiP of Ukraine, 2023. 96 p.

13. Recommended Literature

Main:

1. Digital plant pathology: a foundation and guide to modern agriculture Kuska M.T., Heim R.H.J., Geedicke I., Gold K.M., Brugger A., Paulus S. // Journal of Plant Diseases and Protection (2022) 129:457–468
<https://doi.org/10.1007/s41348-022-00600-z>
2. He, D.-C.; He, M.-H.; Amalin, D.M.; Liu, W.; Alvindia, D.G.; Zhan, J. Biological Control of Plant Diseases: An Evolutionary and Eco-Economic Consideration. *Pathogens* 2021, 10, 1311. <https://doi.org/10.3390/pathogens10101311>
3. Parthasarathy S., Lakshmidevi P., Chellappan G. *Plant Pathology and Disease Management: Principles and Practices*. Publisher: CRC Press, London, 2024. DOI: 10.1201/9781032711973
4. Scortichini, M. Sustainable Management of Diseases in Horticulture: Conventional and New Options. *Horticulturae* 2022, 8, 517. <https://doi.org/10.3390/horticulturae8060517>
5. Trends in Plant Disease Assessment. Ed. Ul Haq I., Ijaz S.. Springer Nature Singapore Pte Ltd. 2022. – 279 pp. <https://doi.org/10.1007/978-981-19-5896-0>
6. Venbrux M, Crauwels S and Rediers H (2023) Current and emerging trends in techniques for plant pathogen detection. *Front. Plant Sci.* 14:1120968. doi: 10.3389/fpls.2023.1120968
1. Kolodiychuk V. D., Kryvenko A. I., Shushkivska N. I. *Workshop on agricultural phytopathology: study guide*. Kyiv: Center for Educational Literature, 2020. 232 p.
2. Complex systems of protection of agricultural crops from diseases: Education. manual / Turenko V.P., Bilyk M.O., Kuleshov A.V. and others; under the editorship V. P. Turenko, M. O. Bilyka; HNAU named after VV Dokuchaeva. Kind. 2nd, add. Kharkiv: Maidan, 2019. 330 p.
3. List of pesticides and agrochemicals permitted for use in Ukraine /edited by V.U. Yashchuk. Kyiv: UnivestMedia, 2023. 1023 p.

Addition:

1. Ayaz, M.; Li, C.-H.; Ali, Q.; Zhao, W.; Chi, Y.-K.; Shafiq, M.; Ali, F.; Yu, X.-Y.; Yu, Q.; Zhao, J.-T.; et al. Bacterial and Fungal Biocontrol Agents for Plant Disease Protection: Journey from Lab to Field, Current Status, Challenges, and Global Perspectives. *Molecules* 2023, 28, 6735. <https://doi.org/10.3390/molecules28186735>

2. North Dakota Field Crop Plant Disease Management Guide. Compiled by Friskop A., Markell S.G., Khan M., 2021. – 152 pp.
3. Worrall, E.A.; Hamid, A.; Mody, K.T.; Mitter, N.; Pappu, H.R. Nanotechnology for Plant Disease Management. *Agronomy* 2018, 8, 285. <https://doi.org/10.3390/agronomy8120285>
4. Agroecological systems of integrated protection of fruit and berry crops from pests and diseases: recommendations. Kind. 2nd, add. and trans. / edited by I.V. Shevchuk. Kyiv: PP Sansparel, 2021. 188 p.
5. Protection of rice from pests, diseases and weeds: training. manual / Dudchenko V.V., Markovska O.E., Averchev O.V., Palamarchuk D.P., Makuha O.V. Kherson: OLDI-PLUS, 2021. 174 p.
6. Lavrenko S.O., Mrynskyi I.M. Pests and diseases of annual leguminous crops: study guide/edited by I.M. Mrynskyi. Kherson: OLDI-PLUS, 2020. 324 p.
7. Pikovsky M.Y., Kyryk M.M. Bioecological features of phytopathogenic fungi *Sclerotinia sclerotiorum* (Lib.) deBary and *Botryotinia fuckeliana* (de Bary) Whetzel: monograph. Kyiv: FOP Yamchynskyi O.V., 2021. 278 p.

Internet resources:

1. Educational and informational portal of the National University of Bioresources and Nature Management of Ukraine: website. URL: <https://elearn.nubip.edu.ua>
2. Journal. Quarantine and plant protection : website. URL: http://archive.nbu.gov.ua/Portal/chem_biol/Kizr/
3. Journal. European Journal of Plant Pathology : website. URL: <https://www.springer.com/journal/10658>
4. European and Mediterranean Organization for Plant Protection. European and Mediterranean Plant Protection Organization : website. URL: <https://www.eppo.int/>
5. National Scientific Agricultural Library of the National Academy of Agricultural Sciences: website. URL: <https://dns.gb.com.ua>
6. Scientific library of the National University of Bioresources and Nature Management of Ukraine: website. URL: <https://nubip.edu.ua/structure/library>
7. Periodically harmful and potentially dangerous hazelnut diseases and their prevention: website. URL: <https://www.pro-of.com.ua/periodichno-shkidlyvi-ta-potencijno-nebezpechni-xvorobi-funduka-ta-ix-profilaktika/>
8. Blueberry diseases: website. URL: <https://content.ces.ncsu.edu/leaf-diseases-of-blueberry>
9. State Production and Consumer Service. Plant protection : website. URL: <https://dpss.gov.ua/fitosanitaria-kontrol-u-sferi-nasinnictva-tarozsadnictva/fitosanitrij-kontrol/fitosanitrij-monitoring>
10. Ministry of Environmental Protection and Natural Resources of Ukraine. State register of pesticides and agrochemicals approved for use in Ukraine: website. URL: <https://mepr.gov.ua/upravlinnya-vidhodamy/derzhavnyj-reyestr-pestytsydiv-i-agrohimiaktiv-dozvolenyh-do-vykorystannya-v-ukrayini/>
11. Official site of the Syngenta company: website. URL: <https://www.syngenta.ua/products/search/crop-protection>
12. AgroMage: website. URL: <https://agromage.com>