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**Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
RUDN University**

Agrarian -Technological Institute

educational division (faculty/institute/academy) as higher education programme developer

COURSE SYLLABUS

Plant Immunity

course title

Recommended by the Didactic Council for the Education Field of:

35.04.04 Agronomy

field of studies / speciality code and title

The course instruction is implemented within the professional education programme of higher education:

Integrated Plant Protection

higher education programme profile/specialisation title

1. COURSE GOAL(s)

The purpose of mastering the discipline "Plant Immunity" is to train qualified specialists who are able to collect and analyze information on breeding and seed production to create highly productive varieties and hybrids resistant to harmful organisms, as well as to clarify plant protection systems against diseases and pests.

2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the discipline "Plant Immunity" is aimed at the formation of the following competencies (part of the competencies) among students:

Table 2.1. List of competences that students acquire through the course study

Competence code	Competence descriptor	Competence formation indicators (within this course)
GK-1	Able to carry out search, critical analysis of problem situations on the basis of a systematic approach, to develop an action strategy	GK-1.2 Uses a systematic approach to solve the tasks
OPK-1	Able to solve the tasks of developing the field of professional activity and (or) organization based on the analysis of scientific and industrial achievements;	OPK-1.2 Uses methods of solving problems in the development of agronomy based on the search and analysis of modern achievements of science and production
OPK-4	Able to conduct research, analyse results and prepare reporting documents	OPK-4.2 Uses information resources, scientific, experimental and instrumental base for research in agronomy
PK-1	Able to collect, process, analyze and systematize scientific and technical information, domestic and foreign experience in the field of agronomy	PK-1.1. Carries out a critical analysis of the information received
PK-2	Able to develop experimental techniques and master new research methods.	PK-2.1 Develops methods for conducting experiments;
PK-4	Able to create models of crop cultivation technologies, plant protection systems, and varieties.	PK-4.2 Able to identify the main and secondary components of models in order to speed up their development;
		PK-4.5 Carries out work to protect plants from harmful objects;
		PK-4.6 Develops and improves measures to protect plants from harmful objects;

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

Mastering the discipline "Plant immunity" is aimed at forming the following competencies (part of the competencies) among students:

Table 3.1. The list of the higher education programme components/disciplines that contribute to the achievement of the expected learning outcomes as the course study results

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
GK-1	Able to carry out search, critical analysis of problem situations on the basis of a systematic approach, to develop an action strategy	Scientific research work / Научно-исследовательская работа; Manuscript Design; Research Practice; Organization of Integrated Plant Protection Systems; Information Technology; Pest Risk Analysis; Forecast of Development of Agricultural Pests and Diseases; Instrumental methods of research; History and methodology of scientific Agronomy;	
OPK-1	Able to solve the tasks of developing the field of professional activity and (or) organization based on the analysis of scientific and industrial achievements;	Biological Method of Plant Protection; Instrumental methods of research; Mathematical Modeling and Design; Bacterial Diseases; Virology; Organization of Integrated Plant Protection Systems; Information Technology; Scientific research work / Научно-исследовательская работа; Research Practice;	
OPK-4	Able to conduct research, analyse results and prepare reporting documents	Scientific research work / Научно-исследовательская работа; Research Practice; Instrumental methods of research; Mathematical Modeling and Design; Bacterial Diseases; Virology;	

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
		Biological Method of Plant Protection; Organization of Integrated Plant Protection Systems;	
PK-1	Able to collect, process, analyze and systematize scientific and technical information, domestic and foreign experience in the field of agronomy	Scientific research work / Научно-исследовательская работа; Research Practice; Pest Risk Analysis; Forecast of Development of Agricultural Pests and Diseases; Organization of Integrated Plant Protection Systems; History and methodology of scientific Agronomy; Information Technology;	
PK-2	Able to develop experimental techniques and master new research methods.	Molecular Methods of Diagnostics; Biological Method of Plant Protection; Organization of Integrated Plant Protection Systems; Plant Protection in Organic Farming; Instrumental methods of research; Scientific research work / Научно-исследовательская работа; Research Practice;	
PK-4	Able to create models of crop cultivation technologies, plant protection systems, and varieties.	Research Practice; Mathematical Modeling and Design; Biological Method of Plant Protection; Organization of Integrated Plant Protection Systems; Plant Protection in Organic Farming; Pest Risk Analysis; Forecast of Development of Agricultural Pests and Diseases; Nematodes;	

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
		Weed biology and management; Bacterial Diseases; Virology;	

* To be filled in according to the competence matrix of the higher education programme.

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

Possible wording

The total labor intensity of the discipline "Plant immunity" is 5 credits for full-time education.

Table 4.1 – Types of educational work by periods of mastering the OP HE for full-time education

Type of academic activities		Total academic hours	Semesters/training modules			
			1	2	3	4
<i>Contact academic hours</i>		33	33			
including:						
Lectures (LC)		11	11			
Lab work (LW)						
Seminars (workshops/tutorials) (S)		22	22			
<i>Self-studies</i>		129	129			
<i>Evaluation and assessment (exam/passing/failing grade)</i>		18	18			
Course workload	academic hours_	180	180			
	credits	5	5			

5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course module title	Course module contents (topics)	Academic activities types
Module 1: The subject, objectives and goals of plant immunity	Topic 1.1. The history of the development and formation of phytobacteriology. The taxonomy of bacteria. Features of metabolism and genetics of bacteria. Methods of penetration into the plant, symptoms of the lesion. Plant resistance to bacteriosis	LC; LW
Module 2: Structural features of phytopathogenic bacteria	Topic 2.1. Morphology, physiology and genetics of bacteria. Features of respiration and enzymatic processes in various groups of bacteria. DNA analysis, characterization of the most pathogenic groups	LC; LW
Module 3: Features of the biology of phytopathogenic bacteria	Topic 3.1. Interaction with the host plant. Genes responsible for bacterial pathogenicity, horizontal gene transfer in bacteria	LC; LW

Course module title	Course module contents (topics)	Academic activities types
Module 4: The influence of climatic and other factors, antagonistic microflora. Bacteriophages, antibiotic producers and competitors	Topic 4.1. The influence of climatic and other factors, antagonistic microflora. Bacteriophages, antibiotic producers and competitors	LC; LW
Module 5: The main methods of combating phytobacteriosis	Topic 5.1. Quarantine measures; phytosanitary and agrotechnical measures. Extermination measures	LC; LW
Module 6: Laboratory research methods	Topic 6.1. Examination of soil and plant material samples for infection with phytobacteria. Methods of isolation into pure culture, preservation in pure culture. Methods of plant inoculation to test the pathogenicity of bacteria	LC; LW

* - to be filled in only for **full**-time training; *LC* - lectures; *LW* - lab work; *S* - seminars.

6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Table 6.1. Classroom equipment and technology support requirements

Type of academic activities	Classroom equipment	Specialised educational / laboratory equipment, software, and materials for course study (if necessary)
Lecture hall	An auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; a blackboard (screen) and multimedia presentation equipment.	
Seminary	An auditorium for seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification, equipped with a set of specialized furniture and multimedia presentation equipment.	
Self-studies	A classroom for independent work of students (can be used for seminars and consultations), equipped with a set of specialised furniture and computers with access to the electronic information and educational environment.	

* The premises for students' self-studies are subject to **MANDATORY** mention

7. RESOURCES RECOMMENDED FOR COURSE STUDY

Main readings:

1. Plant immunity against viruses Publisher-Frontiers Media SA Publisher website-www.frontiersin.org Publication date and place-2017 Series-frontiers Research Topics, Classification-Microbiology (non-medical) Pages-163
2. Integrated plant protection in agrophytocenoses : a textbook for universities / V. E. Torikov, O. V. Melnikova, I. V. Sycheva [et al.] ; edited by V. E. Torikov. — St. Petersburg

: Lan, 2024. — 180 p. — ISBN 978-5-507-48892-6. — Text : electronic // Lan : electronic library system. — URL: <https://e.lanbook.com/book/401012>

Additional readings:

1. Zykin, A.V. English for agricultural universities. Gardening / A. V. Zykin, N. G. Kovalenko. Saint Petersburg : Lan Publ., 2024. 124 p. ISBN 978-5-507-48308-2. — Text : electronic // Lan : electronic library system. — URL: <https://e.lanbook.com/book/367355>

2. Biological protection of plants from stress: a textbook for universities / L. Z. Karimova, V. A. Kolesar, R. I. Safin, G. K. Khuzina. — 3rd ed., revised. — Saint Petersburg : Lan, 2024. — 100 p. — ISBN 978-5-507-49137-7. — Text : electronic // Lan : electronic library system. — URL: <https://e.lanbook.com/book/379346>

Internet sources

1. Electronic libraries (EL) of RUDN University and other institutions, to which university students have access on the basis of concluded agreements:

- RUDN Electronic Library System (RUDN ELS) <http://lib.rudn.ru/MegaPro/Web>
- EL "University Library Online" <http://www.biblioclub.ru>
- EL "Yurayt" <http://www.biblio-online.ru>
- EL "Student Consultant" www.studentlibrary.ru
- EL "Lan" <http://e.lanbook.com/>

2. Databases and search engines:

- electronic foundation of legal and normative-technical documentation <http://docs.cntd.ru/>
- Yandex search engine [https:// www .yandex.ru/](https://www.yandex.ru/)
- Google search engine <https://www.google.ru/>
- Scopus abstract database <http://www.elsevierscience.ru/products/scopus/>

*Training toolkit for self- studies to master the course *:*

The set of lectures on the course «Plant immunity»

* The training toolkit for self- studies to master the course is placed on the course page in the university telecommunication training and information system under the set procedure.

DEVELOPERS:

position, department	name and surname
position, department	name and surname
position, department	name and surname

HEAD OF EDUCATIONAL DEPARTMENT:

name of department	name and surname
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**HEAD
OF HIGHER EDUCATION PROGRAMME:**

position, department	name and surname
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