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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

Bacterial Diseases

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 "Bacterial Diseases" is to familiarize with the features of the structure, physiology and genetics of bacteria, the principles of their classification, the symptoms of plant lesions. Mastering methods of isolating pathogens from plant tissue into a pure culture, calculating their harmfulness and the magnitude of economic damage. Evaluation of integrated control techniques used in the fight against phyto bacteriosis.

2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the discipline "Bacterial Diseases" 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)
OPK-1	Able to solve the problems of development of the field of professional activity and (or) organization on the basis of analysis of the achievements of science and production	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, analyze results and prepare reporting documents	OPK-4.2 Uses information resources, scientific, experimental and instrumental base for research in agronomy
PC-4	Able to develop methods of conducting experiments, master new research methods	PC-4.5 Carries out work to protect plants from harmful objects
		PC-4.6 Develops and improves plant protection measures against harmful objects
PC-7	Able to carry out phytosanitary control at the state border in order to protect the territory of the Russian Federation from the penetration of quarantine and other dangerous pathogens and plant pests, weeds	PC-7.1 Recognizes quarantine objects and identifies quarantine pests and pathogens
		PC-7.2 Conducts examination of crops and crop products for the presence of quarantine facilities

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The discipline "Bacterial Diseases" refers to the part formed by the participants of the educational relations of block B1.B. OP VO.

Within the framework of the OP HE, students also master other disciplines and / or practices that contribute to the achievement of the planned results of the development of the discipline "Bacterial Diseases".

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*
ОПК-1	Способен решать задачи развития области профессиональной деятельности и (или) организации на основе анализа достижений науки и производства;	Bacterial Diseases; Information Technology; Scientific research work / Научно-исследовательская работа;	Biotechnology in Plant Protection; Instrumental methods of research; Mathematical Modeling and Design; Plant Quarantine; Virology; Organization of Integrated Plant Protection Systems; Plant immunity; Scientific research work / Научно-исследовательская работа;
ОПК-4	Способен проводить научные исследования, анализировать результаты и готовить отчетные документы;	Scientific research work / Научно-исследовательская работа; Bacterial Diseases;	Scientific research work / Научно-исследовательская работа; Undergraduate practice / Преддипломная практика; Instrumental methods of research; Mathematical Modeling and Design; Plant Quarantine; Biotechnology in Plant Protection; Virology; Organization of Integrated Plant Protection Systems; Plant immunity;
ОПК-5	Способен осуществлять технико-экономическое обоснование проектов в профессиональной деятельности;		Management and Marketing; Organization of Integrated Plant Protection Systems;
ПК-2	Способен разрабатывать методики проведения экспериментов, осваивать новые методы исследования	Scientific research work / Научно-исследовательская работа; <i>Molecular Methods of Diagnostics**</i> ;	Plant Quarantine; Biotechnology in Plant Protection; Organization of Integrated Plant Protection Systems; Plant immunity; Instrumental methods of research; Scientific research work / Научно-исследовательская работа;
ПК-3	Способен осуществить организацию, проведение и анализ результатов экспериментов (полевых опытов)	Scientific research work / Научно-исследовательская работа;	Scientific research work / Научно-исследовательская работа; Mathematical Modeling and Design; Organization of Integrated Plant Protection Systems;
ПК-6	Способен проводить консультации по инновационным технологиям в агрономии	Information Technology;	Organization of Integrated Plant Protection Systems;
ПК-4	Способен создавать модели технологий возделывания сельскохозяйственных культур, системы защиты растений, сорта	<i>Pest Risk Analysis**</i> ; <i>Forecast of Development of Agricultural Pests and Diseases**</i> ; <i>Nematodes**</i> ; Bacterial Diseases;	Virology; Plant immunity; Mathematical Modeling and Design; Organization of Integrated Plant Protection Systems;

* 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 "Bacterial Diseases" is 3 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>		34	34		48	
including:						
Lectures (LC)		17	17			
Lab work (LW)		17	17			
Seminars (workshops/tutorials) (S)						
<i>Self-studies</i>		48	48			
<i>Evaluation and assessment (exam/passing/failing grade)</i>		26	26			
Course workload	academic hours_	108	108			
	credits	3	3			

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 and objectives of phytobacteriology	Topic 1.1. The history of the development and formation of science. Systematics of bacteria according to physiological and genetic characteristics.	LC; LW
	Topic 1.2. Features of metabolism and genetics of bacteria. Methods of penetration of bacteria into plants and damage to plants, symptoms of damage.	LC; LW
	Topic 1.3. The interaction between the parasite bacterium and the host plant. Plant resistance to bacterial pathogens and the factors determining it.	LC; LW
	Topic 1.4. The relationship between bacteria and other pests and plant pathogens.	LC; LW
	Topic 1.5. The economic significance of phytobacterioses: the economic consequences of damage to crops, a decrease in the quantity and quality of crops.	LC; LW
Module 2: Morphology, physiology and genetics of bacteria	Topic 2.1. Features of respiration, enzymatic processes in various groups of bacteria.	LC; LW
	Topic 2.2. Bacterial systematics based on physiological characteristics and DNA analysis,	LC; LW

Course module title	Course module contents (topics)	Academic activities types
	characteristics of the most pathogenic groups of bacteria: Pseudomonas, Xanthomonas, Erwinia, Agrobacter, and Clavibacter.	
Module 3: Features of biology	Topic 3.1. Interaction with the host plant: symbiotic and parasitic development, survival in plant residues, propagation with seeds and vectors.	LC; LW
	Topic 3.2. Genes responsible for bacterial pathogenicity and horizontal gene transfer in bacteria.	LC; LW
Module 4: Ecology of phytobacteria	Topic 4.1. The influence of climatic factors, physical and chemical soil factors	LC; LW
	Topic 4.2. The influence of antagonistic microflora and microfauna: bacteriophages, antibiotic producers and competitors.	LC; LW
Module 5: The main methods of combating bacteriosis	Topic 5.1. Preventive, quarantine, phytosanitary, agrotechnical and extermination (biological, physical and chemical methods) measures.	LC; LW
Module 6: Bacteria as objects of research	Topic 6.1. Examination of plants, seeds and planting material for infection with phytobacteria	LC; LW
	Topic 6.2. Selection of plant samples. Methods of isolation of bacteria into pure culture.	LC; LW
	Topic 6.3. Diagnosis of bacteria based on phenotypic traits and DNA.	LC; LW
	Topic 6.4. Preservation of bacteria in a pure culture	LC; LW
	Topic 6.5. Methods of plant inoculation to test the pathogenicity of bacteria and plant resistance.	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	Auditorium for lecture-type classes, equipped with a set of specialized furniture; whiteboard (screen) and technical means of multimedia presentations.	
Laboratory	An auditorium for laboratory work, individual consultations, current control and intermediate certification, equipped with a set of specialized furniture and equipment.	List of specialized laboratory equipment, installations, stands, etc.
Self-studies	An auditorium for independent work of students (can be used for seminars and	

Type of academic activities	Classroom equipment	Specialised educational / laboratory equipment, software, and materials for course study (if necessary)
	consultations), equipped with a set of specialized furniture and computers with access to EIOS.	

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

7. RESOURCES RECOMMENDED FOR COURSE STUDY

Main readings:

1. Plant pathology & diseases URI <https://directory.doabooks.org/handle/20.500.12854/67434> DOI 10.5772/intechopen.80762 Webshop link <https://www.intechopen.com/books> ISBN 9781789851168, 9781789851151, 9781789846980 Publisher IntechOpen Publisher website <https://www.intechopen.com/> Publication date and place 2020 Imprint IntechOpen Classification Plant reproduction & propagation Pages 240;

2. Sternshis, M. V. Biological protection of plants : a textbook for universities / M. V. Sternshis, I. V. Andreeva, O. G. Tomilova. — 7th ed., erased. — St. Petersburg : Lan, 2024. — 332 p. — ISBN 978-5-507-49266-4. — Text : electronic // Lan : electronic library system. — URL: <https://e.lanbook.com/book/384752>;

Additional readings:

1. Belousova, A. R. English for students of agricultural universities : a textbook for universities / A. R. Belousova, O. P. Melchina. — 9th ed., erased. — Saint Petersburg : Lan, 2024. — 352 p. — ISBN 978-5-507-51965-1. — Text : electronic // Lan : electronic library system. — URL: <https://e.lanbook.com/book/434129>;

2. Vyugina, G. V. Floriculture of the open ground : a textbook for universities / G. V. Vyugina, S. M. Vyugin. — 7th ed., erased. Saint Petersburg : Lan Publ., 2024. 256 p. ISBN 978-5-507-50379-7. — Text : electronic // Lan : electronic library system. — URL: <https://e.lanbook.com/book/424346>.

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 « Bacterial Diseases »

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