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**Federal State Autonomous Educational Institution of Higher Education  
Peoples' Friendship University of Russia named after Patrice Lumumba  
RUDN University**

Agrarian and Technological Institute

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

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## **COURSE SYLLABUS**

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### **NEMATODES**

course title

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**Recommended by the Didactic Council for the Education Field of:**

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### **35.04.04 AGRONOMY**

field of studies / speciality code and title

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

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### **INTEGRATED PLANT PROTECTION**

higher education programme profile/specialisation title

## 1. COURSE GOAL(s)

The discipline "Nematodes" is part of the Master's program "Integrated Plant Protection" under the field of study 35.04.04 "Agronomy" and is studied in the 1st semester of the 1st year. The discipline is delivered by the Agrobiotechnology Department.

The discipline consists of 7 sections and 25 topics and is aimed at studying nematodes and their control.

The purpose of mastering the discipline is: familiarization with the features of the structure, physiology and genetics of nematodes, the principles of their classification, and the symptoms of plant lesions; mastering the methods of isolating pathogens from plant tissue into pure culture, calculating their harmfulness and the amount of economic damage; evaluation of integrated control techniques used in the fight against nematodes.

## 2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the discipline "Nematodes" is aimed at developing the following competencies (parts of competencies) in students:

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

Competence code	Competence descriptor	Competence formation indicators (within this course)
PC-4	Able to create models of crop cultivation technologies, plant protection systems, and varieties	PC-4.5 Carries out plant protection activities against harmful organisms; PC-4.6 Develops and improves measures for plant protection against harmful organisms;
PC-7	Able to carry out phytosanitary control at the state border to protect the territory of the Russian Federation from the penetration of quarantine and other dangerous pathogens of plant diseases and pests, and weeds	PC-7.1 Recognizes quarantine objects and identifies quarantine pests and pathogens; PC-7.2 Conducts examination of crops and plant products for the presence of quarantine objects;

## 3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The discipline "Nematodes" belongs to the part formed by participants of educational relations of Block 1 "Disciplines (modules)" of the higher education program.

Within the framework of the higher education program, students also master other disciplines and/or practices that contribute to achieving the planned learning outcomes of the discipline "Nematodes".

*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*
PC-4	Able to create models of crop cultivation technologies, plant		Scientific and Research Practice; Mathematical Modeling and Design;

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
	protection systems, and varieties		Biological Method of Plant Protection; Organization of Integrated Plant Protection Systems; Plant immunity; Plant Protection in Organic Farming**; Weed biology and management**; Virology;
PC-7	Able to carry out phytosanitary control at the state border to protect the territory of the Russian Federation from the penetration of quarantine and other dangerous pathogens of plant diseases and pests, and weeds		Plant Quarantine; Virology;

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

\*\* – Elective disciplines/practices

#### 4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total labor intensity of the discipline "Nematodes" is 2 credit units.

Table 4.1. Types of academic activities during the periods of higher education programme mastering (**full-time training**)\*

Type of academic activities	Total academic hours	Semesters/training modules
		1
<i>Contact academic hours</i>	<b>34</b>	<b>34</b>
including:		
Lectures (LC)	<b>0</b>	<b>0</b>
Lab work (LW)	<b>34</b>	<b>34</b>
Seminars (workshops/tutorials) (S)	<b>0</b>	<b>0</b>
<i>Self-studies</i>	<b>23</b>	<b>23</b>
<i>Evaluation and assessment (exam/passing/failing grade)</i>	<b>15</b>	<b>15</b>
<b>Course workload</b>	academic hours	<b>72</b>
	credits	<b>2</b>

\* To be filled in regarding the higher education programme correspondence training mode.

#### 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 main stages of the development of phytonematology	Topic 1.1. The history of the development and formation of science	LW

<b>Course module title</b>	<b>Course module contents (topics)</b>	<b>Academic activities types</b>
	Topic 1.2. Taxonomy of nematodes by lifestyle, morphological and genetic characteristics	LW
	Topic 1.3. Plant resistance to nematodes and the factors determining it	LW
	Topic 1.4. The relationship between nematodes and plant pathogens	LW
	Topic 1.5. The economic importance of nematode diseases	LW
Module 2: The origin and evolution of nematodes, systematics of phytoparasitic nematodes	Topic 2.1. Niches of habitat of various groups of nematodes	LW
	Topic 2.2. Morphological and anatomical features of the structure of phytonematodes	LW
	Topic 2.3. Nematode taxonomy based on morphological features and DNA analysis	LW
Module 3: Harmfulness and economic importance	Topic 3.1. The spread of nematodes	LW
	Topic 3.2. Economic harmfulness of nematodes	LW
Module 4: Biology and Ecology of phytonematodes	Topic 4.1. Reproduction cycles of the main nematode groups	LW
	Topic 4.2. The influence of climatic factors, physical and chemical soil factors on the spread of nematodes	LW
	Topic 4.3. The influence of antagonistic microflora and microfauna	LW
Module 5: Features of the interaction of nematodes and plants	Topic 5.1. Interaction of nematodes with the host plant	LW
	Topic 5.2. Nematode survival in soil, spreading with seeds	LW
Module 6: Characteristic of the main families of phytoparasitic nematodes	Topic 6.1. The families Aphelenchidae and Aphelenchoididae	LW
	Topic 6.2. The family Ditylenchidae	LW
	Topic 6.3. Family Anguinidae	LW
	Topic 6.4. Nematodes as parasites of the root system of plants	LW
	Topic 6.5. Nematodes as carriers of viruses and bacteria	LW
	Topic 6.6. Quarantine phytoparasitic nematodes	LW
Module 7: Methods of control of phytoparasitic nematodes	Topic 7.1. Examination of soil, plants, seeds and planting material for contamination	LW
	Topic 7.2. Methods of nematode isolation	LW
	Topic 7.3. Practical diagnostics based on phenotypic traits and DNA	LW
	Topic 7.4. Preventive, quarantine, phytosanitary, agrotechnical and extermination (biological, physical and chemical methods) measures	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)
Lab work	A classroom for conducting laboratory work, individual consultations, current and mid-term assessment; equipped with a set of specialized furniture and equipment	Computer classes; Multimedia room, projector, 16 workstations
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. *Nematodes*. Publisher: IntechOpen. Publisher website: <https://www.intechopen.com/>. Publication date and place: 2024. Imprint: IntechOpen. Classification: Medical parasitology. Pages: 136.
2. Sternshis, M.V. *Biological protection of plants: a textbook for universities* / M.V. Sternshis, I.V. Andreeva, O.G. Tomilova. — 7th ed., revised. — 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. Diseases, pests and weeds of potato plants. Diagnostic and accounting methods: A textbook for universities / V.N. Zeiruk, G.L. Belov, I.N. Gasparyan [et al.]. — St. Petersburg: Lan, 2022. — 256 p. — ISBN 978-5-8114-8281-8. — Text: electronic // Lan: electronic library system. — URL: <https://e.lanbook.com/book/187510>
2. Integrated plant protection / T.V. Dolzhenko, L.E. Kolesnikov, A.G. Semenova [et al.]. — 3rd ed., ster. — St. Petersburg: Lan, 2024. — 120 p. — ISBN 978-5-507-47304-5. — Text: electronic // Lan: electronic library system. — URL: <https://e.lanbook.com/book/359825>

### *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](http://www.studentlibrary.ru)
- EL "Lan" <http://e.lanbook.com/>
- EL "Znaniium": <https://znaniium.ru/>

## 2. Databases and search engines:

- Sage: <https://journals.sagepub.com/>
- Springer Nature Link: <https://link.springer.com/>
- Wiley Journal Database: <https://onlinelibrary.wiley.com/>
- Scientometric database Lens.org: <https://www.lens.org>

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

- Lecture course on the discipline " Nematodes".

\* 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:**

Professor of the Agrobiotechnology Department

**Ignatov A.N.**

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position, department

name and surname

**HEAD OF EDUCATIONAL DEPARTMENT:**

Director of the Agrobiotechnology Department

**Pakina E. N.**

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name of department

name and surname

**HEAD  
OF HIGHER EDUCATION PROGRAMME:**

Director of the Agrobiotechnology Department

**Pakina E. N.**

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position, department

name and surname