Federal State Autonomous Educational Institution

Higher Education "Peoples' Friendship University of Russia"

Agrarian-Technological Institute

(name of the main training unit (PMO) - the developer of the EP HE)

WORK PROGRAM OF THE DISCIPLINE

Nematode diseases

(name of discipline/module)

Recommended by ISSS for the direction of training/specialty:

35.03.04 Agronomy

(code and name of the direction of training/specialty)

The development of the discipline is carried out within the framework of the implementation of the main professional educational program of higher education (EP HE):

Agronomy

(name (profile/specialization) ep he)

2022

1. THE PURPOSE OF MASTERING THE DISCIPLINE

The purpose of mastering the discipline "Nematode 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 for 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 THE RESULTS OF MASTERING THE DISCIPLINE

Mastering the discipline "Nematode diseases" is aimed at the formation of the following competencies (parts of competencies) among students:

Table 1 - The list of competencies formed by students during the development of the discipline (the results of mastering the discipline)

OPK-1.2; OPK-4.2; PC-4.5; PC-4.6; PC-7.1; PC-7.2

Code	Competence	Competency Achievement Indicators
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
OPK-5	Capable of participating in experimental research in professional activities	OPK-5.1 Participates in experimental research in the field of plant protection under the guidance of a higherly qualified specialist
		OPK-5.2 Uses classical and modern research methods in plant protection
PK-1	Ready to participate in agronomic research, statistical processing of	PK-1.1 Defines, under the guidance of a higherly qualified specialist, research objects

	experimental results, formulation of conclusions	and uses modern laboratory, vegetation and field research methods in agronomy
PK-6	Able to consult on innovative technologies in agronomy	PC-6.1. Able to work with information systems and databases on agricultural production management
		PK-6.2. Able to aggregate the need to use plant protection technologies for accelerated development of agricultural enterprises
PK-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. THE PLACE OF DISCIPLINE IN THE STRUCTURE OF THE OP VO

The discipline "NEMATODE DISEASES" refers to the mandatory part of block B1 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 "NEMATODE DISEASES".

Table 2 – List of components of the HE OP that contribute to the achievement of the planned results of the discipline

Code	**Competence**	**Previous disciplines/modules, practices**	**Subsequent disciplines/modules, practices**
OPK-1	Able to solve typical problems of professional activity on the basis of knowledge of the basic laws of mathematical and natural sciences with the use of information and communication technologies	History and methodology of scientific agronomy Information Technologies Instrumental research methods	Work experience

OPK-4	Able to implement modern technologies and justify their use in professional activities	History and methodology of scientific agronomy Information Technologies Instrumental research methods	Plant Growing, Crop Production Practice, Production Practice
OPK-5	Capable of participating in experimental research in professional activities	Agriculture, History and Methodology of Scientific Agronomy Information Technologies Instrumental research methods	Plant Growing, Plant Growing Practice, Fundamentals of Scientific Research in Agronomy, Production Practice
PK-1	Ready to participate in agronomic research, statistical processing of experimental results, formulation of conclusions	Agriculture, History and Methodology of Scientific Agronomy Information Technologies Instrumental research methods	Crop production, Fundamentals of scientific research in agronomy, Production practice, Pre-diploma practice
PK-7	Able to develop fertilizer application systems taking into account soil properties and biological characteristics of plants	Soil science with the basics of geology	Crop
PK-11	Able to determine the total need for seed and planting material, fertilizers and pesticides	-	Crop
PK-12	Able to control the implementation of the technological process of crop production	Agriculture	Crop

4. THE SCOPE OF DISCIPLINE AND TYPES OF EDUCATIONAL WORK

The total labor intensity of the discipline "Nematode diseases" is 3 credit units (108 hours) for full-time education.

Table 3 – Types of educational work by periods of mastery of OP HE for full-time education

Type of educational work		**Total, aca. hrs.**	**Semesters**	
			5	**6**
Contact work		60	60	-
including:				
Lectures (LC)		17	17	-
Laboratory works (LR)		17	17	-
Practical/Seminar Classes (FPs)		–	–	–
Independent work of students		48	48	-
Control (exam/test with grade)		26	26	-
Overall labor intensity of the discipline	aca. hrs.	**108**	**108**	**-**
	Zach. Units.	3	3	-

5. CONTENTS

Table 4 – Content of the discipline (module) by types of educational work

Name of the discipline section	**Contents**	**Type of educational work**
Section 1. The main stages of the development of phytonematology	Topic 1.1. History of the development and formation of science. Topic 1.2. Systematics of nematodes by lifestyle, morphological and genetic signs. Methods of penetration of nematodes into plants and damage to plants, symptoms of damage. Topic 1.3. Plant resistance to nematodes and the factors that determine it. Topic 1.4. The relationship between nematodes and plant pathogens. Topic 1.5. The economic significance of nematode diseases: the economic consequences of the defeat of crops, a decrease in the quantity and quality of the harvest of cultivated plants.	LC
Section 2. Origin and evolution of nematodes, withthe istematics of phytoparasitic nematodes	Topic 2.1. Niche habitats of various groups of bacteria. Topic 2.2. Morphological and anatomical features of the structure of phytonematodes Topic 2.3. Taxonomy of nematodes, based on morphological features and DNA analysis,	LR, LC
Section 3. Harmfulness and economic significance	Topic 3.1. Distribution of nematodes Topic 3.2. Economic harmfulness of nematodes	LR, LC
Section 4. Biology and Ecology of Phytonematodes	Topic 4.1. Breeding cycles of major groups of nematodes Topic 4. 2. Influence on the spread of nematodes of climatic factors, physical and chemical soil factors; Topic 4. 3. Influence of antagonistic microflora and microfauna: predatory fungi and pathogens of nematodes.	LR, LC
Section 5. Features of the interaction of nematodes and plants	Topic 5. 1. Interaction of nematodes with the host plant: free-living and parasiticspecies, Topic 5.2. Inthe survival of nematodes in the soil, spread with seeds.	LR, LC
Section 6. Characteristics of the main families of phytoparasitic nematodes.	Topic 6.1. Families *Aphelenchidae* and *Aphelenchoididae*	
	Topic 6.2. Family *Ditylenchidae*	
	Topic 6.3. Family *Anguinidae*	
	Topic 6. 4. Nematodes - parasites of the root system of plants: Family Hoplolaimidae; Telotylenchidae; Pratylenchidae; Nacobbidae; Tylenchulidae; Heteroderidae; Meloidogynidae; Genus Globodera; Genus Heterodera	
	Topic 6. 5. Nematodes - carriers of viruses and bacteria	
	Topic 6.6. Quarantine phytoparasitic nematodes	

Section 7. Methods of control of phytoparasytic nematodes	Topic 7.1. Examination of soil, plants, seeds and planting material for contamination. Topic 7.2. Methods of nematode isolation. Topic 7.3. Practical diagnosticsbased on phenotypic traits and DNA. Topic 7.4. Preventive, quarantine, phytosanitary, agrotechnical and exterminatory (biological, physical and chemical methods) measures.	

6. MATERIAL AND TECHNICAL SUPPORT OF DISCIPLINE

Table 5 – Discipline Logistics

Audience type	**Equipping the classroom**	**Specialized educational/laboratory equipment, software and materials for mastering the discipline**
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.
Computer Lab	Computer class for classes, group and individual consultations, current control and intermediate certification, equipped with personal computers (in the amount of _____pieces), a whiteboard (screen) and technical means of multimedia presentations.	List of specialized software installed on computers for mastering the discipline (module)
For independent work of students	An auditorium for independent work of students (can be used for seminars and consultations), equipped with a set of specialized furniture and computers with access to EIOS.	
Audience type	Equipping the classroom	Specialized educational/laboratory equipment, software and materials for mastering the discipline

7. EDUCATIONAL, METHODOLOGICAL AND INFORMATION SUPPORT OF THE DISCIPLINE

Main literature:

1. *Bondarenko N.V., Guskova L.A., Pegelman S.G.* Harmful nematodes, ticks, rodents: A textbook for students of the SKhI on special. "Plant Protection". – M.: Kolos, 1993. – 271 p.

2. *Weisher B., Brown D.D.F.* Acquaintance with Nematodes: General Nematology: Educational for Students. – Sofia; Moscow: Pensoft, 2001. – 206 p.

3. *Danilov L.G.* Development and practical use of biological preparations based on entomopathogenic nematodes for plant protection // Theoretical foundations of the development of biological plant protection products, new selected forms of useful organisms, technologies for the manufacture of biological plant protection products and their use. – M.: Ros. Academy of Agricultural Sciences. Department of Plant Protection, 2004. – P. 32-49.

4. *Dekker H.* Nematodes of plants and the fight against them. – M.: Kolos, 1972. – 444 p.

5. *Zinovieva S.V.* Molecular mechanisms of interaction between plants and parasitic nematodes: theoretical and applied aspects // Parasitic nematodes of plants and insects. – M.: Nauka, 2004. – P. 50-85.

6. *Kiryanova E.S., Krall E.L.* Parasitic nematodes of plants and measures to combat them. – Vol. 1. – Leningrad: Nauka, 1969.

7. Parasitic nematodes of plants and insects / Otv. ed. M.D. Sonin. – M.: Nauka, 2004. – 320 p.

8. *Paramonov A.A.* Basics of Phytohelminthology. – T. I. – M., 1962; VOL. II. – M., 1964; T. III. – M., 1970.

9. *Pokrovskaya T.V.* Meloidoginosis and the fight against gall nematodes. – M.: Nauka, 1988. – 111 p.

10. Applied nematology. – M: Nauka, 2006. – 350 p.

Resources of the information and telecommunication network "Internet":

1. RUDN University EBS and third-party EBS, to which university students have access on the basis of concluded contracts:

– Electronic library system RUDN University – EBS RUDN University http://lib.rudn.ru/MegaPro/Web

– EBS "University Library Online" http://www.biblioclub.ru

- EBS Jurait http://www.biblio-online.ru

– EBS "Student Consultant" www.studentlibrary.ru

- EBS "Lan" http://e.lanbook.com/

- EBS "Trinity Bridge"

2. Databases and search engines:

– electronic fund of legal and normative-technical documentation of the http://docs.cntd.ru/

– Yandex https://www.yandex.ru/ search engine

– Google search engine https://www.google.ru/

– abstract database SCOPUS http://www.elsevierscience.ru/products/scopus/

– http://quakes.globalincidentmap.com/,

– http://www. globalincidentmap. com/,

– ScienceDirect: http://www.sciencedirect.com

– EBSCO: http://search.ebscohost.com

–Sage Publications:http://online.sagepub.com

–Springer/Kluwer:http://www.springerlink.com

–University Information System RUSSIA:

http://www.cir.ru/index.jsp17. http://plpnemweb.ucdavis.edu/nemaplex/Taxadata/G076S8.htm

3. Specialized resources on nematodeology:

http://www.inra.fr/hyppz/RAVAGEUR/3hetave.htm

www.eppo.org/QUARANTINE/nematodes/Ditylenchus_dipsaci/DITYDI_imag

http://www.booksite.ru/fulltext/1/001/010/001/253486564.jpg

http://eppserver.ag.utk.edu/courses/EPP520/Radopholus%20similis%20misc_files/frame.htm

http://ucdnema.ucdavis.edu/imagemap/nemmap/ent156html/slides/fromCD/0847/071B.GIF

http://plpnemweb.ucdavis.edu/Nemaplex/Taxadata/G011S2.htm

http://www.metla.fi/metinfo/metsienterveys/Lajit kansi/buxylo-n.htm

http://plpnemweb.ucdavis.edu/nemaplex/Taxadata/G076S8.htm

http://www.inra.fr/hyppz/IMAGES/7032246.jpg

http://plpnemweb.ucdavis.edu/nemaplex/Taxadata/G076S3.htm#Contents

http://www.invasive.org/browse/subimages.cfm?sub=4905

http://www.forestryimages.org/browse/detail.cfm?imgnum=1356130

http://www.rhs.org.uk/advice/profiles1001/leaf_bud_eelworm.asp

http://www.agrsci.dk/djfpublikation/djfpdf/gvm253.pdf

http://edis.ifas.ufl.edu/IN392

http://www.inra.fr/hyppz/IMAGES/7033332.jpg

http://www.plantdepommedeterre.org/eng/disease/nemal.htm

http://www.zin.ru/Animalia/Nematoda/rus/galnem/text5.htm

Educational and methodical materials for independent work of students in the development of the discipline / module:

1. *Romanenko N.D.* Phytohelminths – virus carriers of the family Longidoridae. – M.: Nauka, 1993. – 284 p.

2. *Subbotin S.A., Osipova E.V.* Histological and cytological changes in the roots of a susceptible variety of barley in the defeat of an oat cyst-forming nematode // Bul. of the All-Union Institute of Helminthology named after Scriabin. – 1985. – T. 41. – P. 94.

3. *Subbotin S.A.* Changes in the ultrastructure of Citrus sinensis root cells under the influence of the citrus nematode Tylenchulus semipenetrans // Cytology and Genetics. – 1990. – Vol. 24. – No 1. – P. 3-8.

4. *Subbotin S.A.* Evolution of modified feeding cells induced by sedentary nematodes in plant roots // Ros. nematol. zhurn. – 1993. – Vol. 1. – No 1 – P. 17-26.

5. *Teplyakova T.V.* Bioecological aspects of the study and use of predatory fungi-hyphomycetes. – Novosibirsk, 1999. – 252 p.

6. *Shesteperov A.A., Savotikov Yu.F.* Quarantine phytohelminthiases. – Kn. 1. – M.: Kolos, 1995. – 463 p.

8. ASSESSMENT MATERIALS AND POINT-RATING SYSTEM FOR ASSESSING THE LEVEL OF FORMATION OF COMPETENCIES IN THE DISCIPLINE "Nematode Diseases"

Specialty: 35.03.04 Agronomy 1 semester

Code of a supervised competency or part of it	Controlled discipline section	Controlled theme of discipline	Name of the appraisal tool				Certification		Points Themes	Points Section
			Current control							
			Performing Home Job	Execution laboratory assistant Of work	Report, presentation	Tests	Maximum	Total		
OPK-1.1; OPK-1.2; OPK-4.2; OPK-5.1; OPK-5.2; OPK-5.3; PC-2.1; PC-2.2; PC-3.2; PC-4.2; PC-4.5; PC-4.6; PC-6.2	Section 1. The main stages of the development of phytonematology	Topic 1.1. History of the development and formation of science. Topic 1.2. Systematics of nematodes by lifestyle, morphological and genetic characteristics. Methods of penetration of nematodes into plants and damage to plants, symptoms of damage. Topic 1.3. Plant resistance to nematodes and the factors that determine it.	1	4	3	2	10	10	10	20
		Topic 1.4. The relationship between nematodes and plant pathogens. Topic 1.5. The economic significance of nematode diseases: the economic consequences of the defeat of crops, a decrease in the quantity and quality of the harvest of cultivated plants.	1	4	3	2			10	
	Section 2. Origin and evolution of nematodes, systematics of phytoparasitic nematodes	Topic 2.1. Habitat niches of various groups of nematodes. Topic 2.2. Morphological and anatomical features of the structure of phytonematodes	1	4	3	2			10	20
		Topic 2.3. Taxonomy of nematodes based on morphological features and DNA analysis	1	4	3	2			10	
	Section 3. Harmfulness and economic significance	Topic 3.1. Distribution of nematodes	1	4	3	2			10	20
		Topic 3.2. Economic harmfulness of nematodes	1	4	3	2			10	
		Topic 4.1. Breeding cycles of major groups of nematodes	1	4	3	2			10	20

Code of a supervised competency or part of it	Controlled discipline section	Controlled theme of discipline	Name of the appraisal tool				Certification		Points Themes	Points Section
			Current control				Maximum	Total		
			Performing Home Job	Execution laboratory assistant	Report, presentation	Tests				
	Section 4. Biology and Ecology of Phytonematodes	Topic 4.2. Influence on the spread of nematodes of climatic factors, physical and chemical soil factors; Topic 4.3. Influence of antagonistic microflora and microfauna: predatory fungi and pathogens of nematodes.	**1**	**4**	**3**	**2**			10	
	Section 5. Features of the interaction of nematodes and plants	Topic 5.1. Interaction of nematodes with the host plant: free-living and parasitic species, Topic 5.2. Survival of nematodes in the soil, spread with seeds.	**1**	**4**	**3**	**2**			10	10
	Section 6. Characteristics of the main families of phytoparasitic nematodes.	Topic 6.1. Families Aphelenchidae and Aphelenchoididae Topic 6.2. Family Ditylenchidae Topic 6.3. Family Anguinidae Topic 6.4. Nematodes - parasites of the root system of plants: Family Hoplolaimidae; Telotylenchidae; Pratylenchidae; Nacobbidae; Tylenchulidae; Heteroderidae; Meloidogynidae; Genus Globodera; Genus Heterodera Topic 6.5. Nematodes - carriers of viruses and bacteria Topic 6.6. Quarantine phytoparasitic nematodes	**1**	**4**	**3**	**2**			10	10
	Section 7. Methods of control of phytoparasytic nematodes	Topic 7.1. Examination of soil, plants, seeds and planting material for infestation. Topic 7.2. Methods of nematode isolation. Topic 7.3. Practical diagnosis of nematodes based on phenotypic traits and DNA. Topic 7.4. Preventive, quarantine, phytosanitary, agrotechnical and exterminatory (biological, physical and chemical methods) measures.	**1**	**4**	**3**	**2**			**10**	**10**
		TOTAL	**12**	**48**	**36**	**24**	**10**	**10**	**100**	

Criteria for the evaluation of controlled types of work

№ p/n	Estimated parameters	Scores	
		Matches Parameters	Does not match the parameters
1	**Doing homework for lab work** - executed completely, carefully -partially executed, carelessly	 1 0.5	 0 0
2	**Perform lab work** -made by yourself completely, carefully decorated -made independently, carelessly designed -made partially independently -performed with an error in the result of the work	 4 3 2 1	 0 0 0 0
3	**Report, presentation of the section** -Clearly lined up, well illustrated -the report and presentation are well designed, but there are inaccuracies -answers all questions -can't answer most questions -conclusions are entirely derived from the work - conclusions are fuzzy	 1 0.5 1 0.5 1 0.5	 0 0 0 0 0 0
4	**Tests** -Correctly answered 95-100% of the questions -Correctly answered 80-94% of questions -Correctly answered 50-79% of questions	 2 1 0.5	 0 0 0
5	**Milestone attestation** *1) Quality of oral answer to questions* (a) Completeness of the response -Replied in full -Answered most of the questions -Didn't answer most of the questions b) Consistency of the answer - The answer is built logically - The answer is built illogically *2)Test part* -Correctly answered 95-100% of the questions -Correctly answered 80-94% of questions -Correctly answered 50-79% of questions	 2.5 1.5 0.5 2.5 0.5 5 4 2	 0 0 0 0 0 0 0 0
	Total:	10	0
6	**Final attestation** *1) Quality of oral answer to questions* (a) Completeness of the response -Replied in full -Answered most of the questions -Didn't answer most of the questions b) Consistency of the answer - The answer is built logically - The answer is built illogically *2)Test part* -Correctly answered 95-100% of the questions -Correctly answered 80-94% of questions -Correctly answered 50-79% of questions	 2.5 1.5 0.5 2.5 0.5 5 4 2	 0 0 0 0 0 0 0 0
	Total:	10	0

Questions for self-assessment and discussions on topics.

1. Parasitism, symbiosis, mutualism, commensalism, predation and other biocenotic relationships.
2. Characteristics of nematodes of the order enoplid.
3. Principles of ecological grouping of phytonematodes according to A.A. Paramonov.
4. Heteroderosis of grain crops.
5. The concept of parasitism and parasites.
6. Characteristics of nematodes of the order Mononchid
7. Races of nematodes and racially specific resistance.
8. Potato globoderosis.
9. Conditions for the formation of a biocenotic pair "parasite-host".
10. Characteristics of nematodes of the order Dorylamide.
11. Parasitism and predation in nature.
12. General body structure of nematodes. Types of tails in nematodes of various ecological groups.
13. Life cycles of ditilenchs.
14. Ditilenkhoz potatoes.
15. Spatial and temporal relationships of parasites and host (ecto-, endoparasitism, temporal and stationary parasitism).
16. General concept of the ecology of nematodes. The role of biocenoses in the formation of a complex of nematode species and the density of their populations.
17. Regularities of occurrence and distribution of epiphytotes of phytohelminthiases.
18. Ditilenhoz luka.
19. Agrotechnical methods of combating phytohelminthiases. Crop rotations - the basis management of phytonematode populations.
20. Aphelenchoidosis of rice.
21. Basic morphophysiological and biochemical adaptations of phytoparasites to a parasitic lifestyle.
22. The role of nematodes of the order dorilamide in the etiology of viral diseases.
23. Strawberry aphelenchoidosis.
24. Biological methods of control of phytohelminths.
25. Digestive organs of phytonematodes. Types of esophagus (rhabditoid, diplogasteroid, cephaloboid, panagrolaymoid, aphelenchoid, thylenchoid, hoplolaymoid, dorylaymoid) and their importance in systematics.
26. Factors determining the economic thresholds of harmfulness of phytohelminths.

27. Bursafelenhoz pine.
28. Organs of reproduction of nematodes. Didelf and monodelphic structure of sexual tubes of females. The structure of eggs and methods of their laying.
29. Epiphytotic process in phytohelminthiases.
30. Diagnosis of phytohelminths, host plants, symptoms of damage.
31. Factors regulating the number of parasites.
32. Characteristics of the nematodes of the order Dielenchid. Economically important species of nematodes. The current state of the issue of phylogeny of phytohelminths of the order Tylenchid.
33. Features of the development of parasitic nematodes. Methods of invasion of plants by nematodes.
34. Physical methods of control of phytohelminths.
35. Ways and mechanism of penetration of parasites into the host organism.
36. Areas of greatest harmfulness of parasitic nematodes. Dominance parasitic species of nematodes in ecosystems.
37. Integrated system of plant protection measures against phytohelminthiasis.
38. Ditilenhoz of berry crops.
39. Trophic connections of nematodes with plants. Histological cytological and biochemical changes in plant tissues with their defeat by parasitic nematodes.
40. Prevention of phytohelminthiases.
41. Dualism of phytohelminths: pest or pathogen.
42. Characteristics of nematodes of the order Aphelenchid. Most important in economically, species of nematodes.
43. Plant immunity and mechanisms of nematodostability.
44. Chemical measures to combat phytohelminths.
45. The essence and tasks of epiphytotiology of phytohelminthiases.
46. Characteristics of nematodes of the order Rhabditida. Major families and genera of this squad.
47. The current state of the doctrine of embryonic development of nematodes.
48. Biological control methods and the use of resistant varieties in control with phytohelminths.
49. Principles of phytonematodes systematics. Indices used in taxonomy of nematodes.

Exam TICKETS

DISCIPLINE: Nematode diseases

(1 SEMESTER)

PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA

Agrarian-Technological Institute

Agrobiotechnology Department

Discipline: NEMATODE DISEASES

Exam TICKET No 1

1. Role and tasks of nematodeology
2. Diagnosis of nematode plant diseases. Diagnostic methods.
3. Types of nematodes in relation to plants.
4. Principles of molecular biological methods for diagnosing nematodes

Minutes of No_____ discussed at the meeting of the Department_____

Compiled by __ A.N. Ignatov

Director of Department____ E.N. Pakina

PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA

Agrarian-Technological Institute

Agrobiotechnology Department

Discipline: NEMATODE DISEASES

CREDIT TICKET No 2

1. Physiological role of plant immunity to nematodes
2. The role of biologists in the development of nematodeology (helminthology)
3. Gall nematodes of plants
4. Principle of the method of morphological classification of nematodes

Minutes of No_____ discussed at the meeting of the Department_____

Compiled by __ A.N. Ignatov

Director of Department_____ E.N. Pakina

PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA

Agrarian-Technological Institute

Agrobiotechnology Department

Discipline: NEMATODE DISEASES

CREDIT TICKET No 3

1. Methods of soil and plant material collection for the diagnosis of nematodes
2. Anatomical structure of nematodes
3. Ways of distribution of phytopathogenic nematodes
4. Principle of methods for isolating nematodes from soil and plants

Minutes of No_____ discussed at the meeting of the Department_____

Compiled by __ A.N. Ignatov

Director of Department_____ E.N. Pakina

PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA

Agrarian-Technological Institute

Agrobiotechnology Department

Discipline: NEMATODE DISEASES

CREDIT TICKET No 4

1. Features of phytopathogenic namatodes
2. Survival of phytopathogenic nematodes in the soil
3. Free-living nematodes and carriers of phytopathogenic microorganisms
4. Phytopathogenic nematodes -carriers of bacterial phytopathogens

Minutes of No_____ discussed at the meeting of the Department_____

Compiled by __ A.N. Ignatov

Director of Department_____ E.N. Pakina

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Agrobiotechnology Department

Discipline: NEMATODE DISEASES

CREDIT TICKET No 5

1. Nematode elisitors of plant protective reactions
2. Types of diagnosis of phytopathogenic nematodes
3. Selection of plant samples for the diagnosis of nematode infestation
4. Principles of ecological grouping of phytonematodes according to A.A. Paramonov.

Minutes of No_____ discussed at the meeting of the Department_____

Compiled by __ A.N. Ignatov

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Agrobiotechnology Department

Discipline: NEMATODE DISEASES

CREDIT TICKET No 6

1. Physiological role of nematode enzymes in pathogenesis
2.Types of diagnostics and identification of taxonomic affiliation of plant pathogens
3. Reaction of nematodes to environmental factors
4. Characteristics of nematodes of the order enoplid.

Minutes of No_____ discussed at the meeting of the Department_____

Compiled by __ A.N. Ignatov

Director of Department_____ E.N. Pakina

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Agrarian-Technological Institute

Agrobiotechnology Department

Discipline: NEMATODE DISEASES

CREDIT TICKET No 7

1. The role of nematodes in crop losses of major crops.
2. Classification of nematodes
3. Heteroderosis of grain crops.
4. Principles of control of nematode plant diseases

Minutes of No_____ discussed at the meeting of the Department_____

Compiled by __ A.N. Ignatov

Director of Department_____ E.N. Pakina

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Agrobiotechnology Department

Discipline: NEMATODE DISEASES

CREDIT TICKET No 8

1. The concept of parasitism
2. Characteristics of nematodes of the order Mononchid
3. Phytopathogenic nematodes in soil and irrigation water.
3. Genetic methods in nematode taxonomy
4. Chemical methods of plant protection against nematodes

Minutes of No_____ discussed at the meeting of the Department_____

Compiled by __ A.N. Ignatov

Director of Department_____ E.N. Pakina

PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA

Agrarian-Technological Institute

Agrobiotechnology Department

Discipline: NEMATODE DISEASES

CREDIT TICKET No 9

1. Races of nematodes and racially specific resistance.
2. Potato globoderasis.
3. Conditions for the formation of a biocenotic pair "parasite-host".
4. Soil microbiome – importance for the fight against nematode plant diseases

Minutes of No_____ discussed at the meeting of the Department_____

Compiled by __ A.N. Ignatov

Director of Department_____ E.N. Pakina

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Discipline: NEMATODE DISEASES

CREDIT TICKET No 10

1. Biological method of combating nematode diseases
2. Characteristics of nematodes of the order Dorilamide.
3. Characteristics of nematodes of the order Rhabditida. Major families and genera of this squad.
4. Embryonic development of nematodes.

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Evaluation criteria:

(*in accordance with the current regulatory framework*)

Compliance of grading systems (previously used grades of final academic performance, ECTS grades and the point-rating system (BRS) of assessments of current academic performance).

BRS Scores	**Traditional Assessments of the Russian Federation**	**Evaluation ECTS**
95 – 100	5	A
86 – 94		B
69 – 85	4	C
61 – 68	3	D
51 – 60		E
31 – 50	2	FX
0 – 30		F
51-100	Credit	Passed

Tests for the course "NEMATODE DISEASES"

Test tasks

What the:

1) Amphides

– chemoreceptors of nematodes

- Cuticle outgrowths

- Nematode teeth.

2) Suspended animation

- A temporary state of the organism in which all manifestations of life are almost completely absent.

- Ability to live without access to oxygen

- Pathogenesis of nematodes

3) Aromorphosis

– morphophysiological progress – the process of evolution of animals, in which there is a change in their organization and functions, contributing to an increase in the level of vital activity, a better adaptation to environmental conditions and the biological progress of the species.

- changes in the appearance of an individual in the process of ontogenesis

- Manifestation of sexual dimorphism

4) Bursa

– transparent cuticular fold on the tail of a male nematode

- Bag with nematode eggs

- Nematode stiletto.

5) Vulva

- The genital opening of a female nematode.

- Sharp end of the nematode egg

- cyst opening through which nematode larvae exit

6) Gauls

– pathological neoplasms on various organs of plants that arise under the influence of pathogens and pests.

- growths with spare substances in plants

- Nodules

7) Hydrobiont

– a permanent inhabitant of the aquatic environment or part of the life cycle has an aquatic phase of development.

8) Hyperplasia

– an increase in the volume of tissue as a result of cell neoplasm.

9) Hypertrophy

– excessive increase in the volume of an organ or part of the body

- excessive nutrition of the body

- increase in the number of cells of the body

10) Histolysis

– the process of self-destruction of body tissues by dissolving them with enzymes or digestion by phagocytes.

- The process of digestion of prey by a predator

- The process of decomposition of a dead organism.

11) Dimorphism

– the presence in the composition of one species of organisms of two different forms

- change in the morphology of the organism as one grows older

- changes in the lifestyle of the body.

12) Invasion

– infection of the body with parasitic animals

- Distribution of the range to new territories

- Infection of the body with pathogens

13) Polygostality

– multi-farming

- variety of morphological forms

- the diversity of ecological niches occupied.

14) Polyphage

– an organism that feeds on a variety of feeds.

- A predator that hunts prey larger than itself

- A predatory organism that feeds on bacteria.

Evaluation criteria:

(*in accordance with the current regulatory framework*)

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Director of department ___ E. N. Pakina

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Evaluation materials and a point-rating system for assessing the level of formation of competencies (part of competencies) based on the results of mastering the discipline "NON-MATODE DISEASES" are presented in the Appendix to this Work Program of the discipline.

DEVELOPERS:

Professor of Agrobiotechnology Department		Ignatov A.N.
(position, BCD)	(Signed)	(Surname: F.I.)
(position, BCD)	(Signed)	(Surname: F.I.)
(position, BCD)	(Signed)	(Surname: F.I.)

HEAD OF BCD:

Director of Agrobiotechnology Department		Pakina E. N.
(position, BCD)	(Signed)	(Surname: F.I.)

HEAD OF EP HE:

Director of Agrobiotechnology Department		Pakina E. N.
(position, BCD)	(Signed)	(Surname: F.I.)