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ФИО: Ястребов Олег Александрович
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**Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
NAMED AFTER PATRICE LUMUMBA
RUDN University**

Agrarian-Technological Institute

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

COURSE SYLLABUS

Biotechnology in Plant Protection

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. CONCENTRATION OF DISCIPLINE

The purpose of the course is the formation of theoretical knowledge and familiarization with the practical problems of implementing biotechnological methods and techniques in the production of healthy planting material of vegetatively propagated agricultural and ornamental crops, in obtaining plant forms with fundamentally new properties and qualities within economically significant species, in the mass production and use of biological products with antibacterial, fungicidal and insecticidal activity.

2. REQUIREMENTS FOR THE RESULTS OF MASTERING THE DISCIPLINE:

Mastering the discipline "Biotechnology in plant protection" is aimed at forming the following competencies (part of the competencies) among students:

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

Code	Competence	Competency Achievement Indicators
UK-1	Able to carry out search, critical analysis of problem situations on the basis of a systematic approach, to develop an action strategy	UK-1.3 Develops a strategy for achieving the set goal as a sequence of steps, anticipating the result of each of them and assessing their impact on the external environment of the planned activity and on the relationships of the participants in this activity
UK-2	Able to manage the project at all stages of its life cycle	UK-2.1 Develops the concept of the project within the framework of the designated problem, formulating the goal, objectives, relevance, significance (scientific, practical, methodological and other depending on the type of project), expected results and possible areas of their application UK-2.2 Forms a schedule for the implementation of the project as a whole and a plan for monitoring its implementation, organizes and coordinates the work of project participants UK-2.3 Offers possible ways (algorithms) of implementation of the project results into practice (or implements it)
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-1.1 Demonstrates knowledge of the main methods of analyzing the achievements of science and production in agronomy 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-1.3 Applies available technologies, including information and communication technologies, to solve the problems of professional activity in agronomy
OPK-4	Able to conduct research, analyze	OPK-4.2 Uses information resources,

	results and prepare reporting documents	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	PC-1.1 Performs critical analysis of the information received
PK-2	Able to develop methods of conducting experiments, master new research methods	PK-2.1 Develops methods for conducting experiments

3. THE PLACE OF DISCIPLINE IN THE STRUCTURE OF THE OP VO:

The discipline "Biotechnology in Plant Protection" refers to the variable 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 "Biotechnology in Plant Protection".

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
UK-1	Able to carry out search, critical analysis of problem situations on the basis of a systematic approach, to develop an action strategy	Research Practice Plant protection in organic farming Organization of integrated plant protection systems	Graduation qualification work Preparation and passing of the state exam
UK-2	Able to manage the project at all stages of its life cycle	Instrumental research methods Mathematical modeling and design Biological method of plant protection Organization of integrated plant protection systems	Plant immunity Graduation qualification work Preparation and passing of the state exam
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	Biology of weedy vegetation Plant protection in organic farming Nematode diseases	Virology Plant Quarantine Molecular Methods for Diagnosing Phytopathogens Bacterial Diseases
OPK-4	Able to conduct research, analyze results and prepare reporting documents	Instrumental research methods Mathematical modeling and design	Plant immunity Graduation qualification work Preparation and

			passing of the state exam
PK-1	Able to collect, process, analyze and systematize scientific and technical information, domestic and foreign experience in the field of agronomy	Plant quarantine Pest and disease prognosis Pre-diploma practice	Plant immunity Graduation qualification work Preparation and passing of the state exam
PK-2	Able to develop methods of conducting experiments, master new research methods	Instrumental research methods Mathematical modeling and design	Plant immunity Graduation qualification work Preparation and passing of the state exam

4. SCOPE OF DISCIPLINE AND TYPES OF EDUCATIONAL WORK

The total labor intensity of the discipline is 3 credits.

4.1. Types of educational work by periods of mastering the EP HE for full-time education

Type of educational work	Altogether	Semesters	
		7th	8th
Total labor intensity, hour	108	108	
Contact work	45	45	
Lecture	15	15	
Seminars	30	30	
Independent work	55	55	
Control	8	8	

5. THE CONTENT OF THE DISCIPLINE.

5. 1. Contents of the discipline sections

No p/n	Name of the discipline section	Contents
1.	Modern problems of biotechnology in crop production and its biosafety	Modern achievements of biotechnology. The level of research in developed and developing countries of the world. Biosafety of genetically modified objects of animal origin. Biosafety of genetically modified objects of plant origin. The role of food chains in the distribution and utilization of GMO producers. The need for control and restrictions in the field of GMO production.
2.	Rehabilitation of vegetative-propagating plants, their reproduction and distribution	Harmfulness of plant viruses by economically important species, symptoms of disease manifestations. Obtaining and reproduction of healthy planting material of vegetative-propagated plants. Features of its distribution and quality control. Minimizing the size of the original meristematic material. Methods, techniques and technologies of plant healing. Thermo-therapy and chemotherapy. In vitro cloning technology. Modern methods of diagnosis and control of viral infection. Certification scheme of healed planting material of higher categories

3.	Increasing the resistance of agricultural plants to pathogens and environmental factors	Creation of forms and varieties resistant to diseases, pests, herbicides and adverse environmental factors using GMO technologies. Introduction of fragments of foreign genes into the genome of economically significant species. The emergence of forms with fundamentally new properties. Invulnerability of plants by pests and diseases, their resistance to environmental factors
4.	Production of biological preparations, their effectiveness, preparative forms and application	Search and selection of the most aggressive in natural conditions strains of parasitic organisms of pests and diseases of agricultural plants. Development and production of immunomodulators and biological preparations for the control of pests and diseases of agricultural crops. Features of their application and storage. Reduction and elimination of the use of synthetic highly toxic pesticides, the frequency of their use

5.2. Sections of disciplines and types of classes

Nop/n	Name of the discipline section	Lecs.	Semin	CPC	Counter.	All-go hour.
1.	Modern problems of biotechnology in crop production and its biosafety	6	6	15		27
2.	Rehabilitation of vegetative-propagating plants, their reproduction and distribution	13	13	14		39
3.	Increasing the resistance of agricultural plants to pathogens and environmental factors	13	13	13		39
4.	Production of biological preparations, their effectiveness, preparative forms and application	13	13	13		39
	Just an hour.	45	45	55	8	108

6. Laboratory workshop

(not provided)

7. Practical exercises (seminars)

No p/n	Discipline Section No	Topics of practical exercises (seminars)	Work Capacity (hours)
1.	1	Biosafety of genetically modified objects of animal and plant origin.	3
2.	1	The role of food chains in the distribution and utilization of GMO producers	3
3	2	Harmfulness of plant viruses by economically important species, symptoms of disease manifestations	4
4.	2	Methods, techniques and technologies of plant healing.	2
5.	2	Modern methods of diagnosis and control of viral infection.	4
6.	2	Certification scheme of healed planting material of higher categories	4
7.	3	Biotechnological methods for increasing plant resistance to phytopathogens	4
8.	3	Biotechnological methods to increase the resistance of plants to environmental factors	2
9.	4	Biotechnological methods of development and production of biological products for the fight against fungal diseases	4
10.	4	Biotechnological methods of development and production of biological products for pest control	3
11.	4	Biotechnological methods of development and production of biological preparations for weed control	3
12.	4	Features of application and storage of biological products	2
	Total		36

8. Material and technical support of the discipline:

1. Classrooms equipped with multimedia projectors.
2. Computer classes of ATI, the information library center of RUDN University with access to the electronic library system of RUDN University, the Internet.
3. Full-featured biotechnological laboratory of rehabilitation and primary reproduction of agricultural plants

9. Information support of discipline

(a) Software:

- Windows 7 Enterprise
- Microsoft Office.
- Adobe Acrobat.

b) databases, reference and search engines:

<http://quakes.globalincidentmap.com/>,

<http://www.globalincidentmap.com/>,

http://earthquake.usgs.gov/earthquakes/recenteqsww/Quakes/quakes_all.php,

http://www.thesis.lebedev.ru/forecast_activity.html

Electronic library system RUDN University – EBS RUDN University:
<http://lib.rudn.ru:8080/MegaPro/Web>
RUDN University Educational Portal (<http://web-local.rudn.ru>);
University Library Online: <http://www.biblioclub.ru>
National digital resource "RUKONT": <http://rucont.ru>
IQlib: <http://www.iqlib.ru>
ScienceDirect: <http://www.sciencedirect.com>
EBSCO: <http://search.ebscohost.com>
Sage Publications: <http://online.sagepub.com>
Springer/Kluwer: <http://www.springerlink.com>
Taylor & Francis: <http://www.informaworld.com>
Web of Science: <http://www.isiknowledge.com>
University Information System RUSSIA: <http://www.cir.ru/index.jsp>
U chebny portal RUDN University: <http://web-local.rudn.ru/>
[Http://www.studmedlib.ru](http://www.studmedlib.ru) Student Advisor

Educational and methodological support of the discipline:

Main literature:

1. Biotechnology – agro-industrial complex // V.I.Artamonov. – M.:Nauka, 1989 – 160 p.
2. Lewin. B. Geny, Publishing House "Mir", 1987
3. Mamontov S.G., Zakharov V.B. Obshchaya biologiya. M.; Ed. "Higher School", 1996
Molecular Biology (Structure and Biosynthesis of Nucleic Acids, Graduate School, 1990.
4. Muromtsev G.S., Butenko R.G., Tikhonenko T.I., Prokofiev M.I. Fundamentals of agricultural biotechnology. M.: Agropromizdat, 1990. - p. 384
5. Pomazkov Yu.I., Zaets V.G. Biological protection of plants (short course). – M.: Izd-vo RUDN. - 1997. – 116 p.
6. Agricultural biotechnology: Textbook /V.S.Shevelukha, Kalashnikova E.A. et al.; Ed. by V.S.Shevelukhi – 2nd ed. pererab. i dop. – M.: Vysshaya. shk., 2003. p. 468.

7. Chenikalova, E.V. Biotechnology in plant protection: a workshop on the performance of laboratory work. - Stavropol: AGRUS stavropolskogo gosudarstvennogo agrarianskogo universiteta, 2013. – 108 p.

8. Chulkina, V. A. Integrated plant protection: phytosanitary systems and technologies: a textbook for universities on agron. Specialties. - M.: Kolos, 2009. - 670 p. - (Textbook. Gr. MSH RF)

9. Sternshis M. V. Biotechnology in plant protection : Ucheb. Posobie–MSH RF. Novosibirsk :Novosib. gos. agrarian. un-t, 2001. - 153 s

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

Assessment 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 "Biotechnology in plant protection" are presented in the Annex to this Work Program of the discipline.

DEVELOPERS:

Associate Professor of agrobiotechnology

department

(position, BCD)

_____ (Signed)

Kornatskiy S. A.

(Surname: F.I.)

HEAD OF BUP:

Director of

Agrobiotechnology Department

(position, BCD)

_____ (Signed)

Pakina E. N.

(Surname: F.I.)

HEAD OF EP HE:

Director of

Agrobiotechnology Department

(position, BCD)

_____ (Signed)

Pakina E. N.

(Surname: F.I.)

E.N. Pakina