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

COURSE SYLLABUS

BREEDING AND SEED PRODUCTION

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:

GENERAL AGRONOMY

higher education programme profile/specialisation title

2024

1. THE GOAL OF MASTERING THE DISCIPLINE

The discipline "Breeding and Seed Production" is included in the master's program "General Agronomy" in the direction 35.04.04 "Agronomy" and is studied in 3, 4 semesters of the 2nd year. The discipline is implemented by the Agrobiotechnology Department. The discipline consists of 12 sections and 32 topics and is aimed at studying plant breeding, breeding process techniques.

The purpose of mastering the discipline is to obtain basic knowledge of plant breeding methods, organization and technology of the breeding process and seed production of agricultural crops.

2. REQUIREMENTS TO THE RESULTS OF MASTERING THE DISCIPLINE

Mastering the discipline "Breeding and Seed Production" is aimed at developing the following competencies (parts of competencies) in students:

Table 2.1. List of competencies developed in students while mastering the discipline (results of mastering the discipline)

Cipher	**Competence**	**Indicators of Competence Achievement** (within the framework of this discipline)
OPK-4	Able to conduct scientific research, analyze results and prepare reporting documents	OPC-4.1 Analyzes methods and ways of solving research problems; OPK-4.2 Uses information resources, scientific, experimental and instrumental base for conducting research in agronomy;
PC-1	Capable of organizing experiments (field trials) to assess efficiency of innovative technologies (elements technologies), varieties and hybrids under production conditions	PC-1.1 Draws up a research program to study the effectiveness of innovative technologies (elements of technology), varieties and hybrids, develops methods for conducting experiments, masters new methods research;
PC-2	Able to develop and implement environmentally friendly techniques and technologies for the production of high-quality plant products taking into account properties of agricultural landscapes and economic efficiency	PC-2.3 Justifies the specializations and types of grown products in an agricultural organization;
PC-3	Able to determine directions improvement and increase in the efficiency of cultivation technologies plant products based on scientific achievements and best practices domestic and foreign manufacturers	PC-3.1 Identifies promising areas for increasing the efficiency of crop production;
PC-4	Capable of creating models of cultivation technologies agricultural crops, plant protection systems, varieties	PC-4.1 Creates models of cultivation technologies agricultural crops, plant protection systems, varieties;

3. PLACE OF DISCIPLINE IN THE STRUCTURE OF EDUCATIONAL EDUCATIO

The discipline "Breeding and seed production" is a compulsory part of block 1 "Disciplines (modules)" of the educational program of higher education.

As part of the higher education program, students also master other disciplines and/or practices that contribute to the achievement of the planned results of mastering the discipline "Breeding and Seed Production".

Table 3.1. List of components of the educational program of higher education that contribute to the achievement of the planned results of mastering the discipline

Cipher	Name of competence	Preceding courses/modules, practices*	Subsequent disciplines/modules, practices*
OPK-4	Capable of conducting scientific research, analyze results and prepare reports documents	Research work;	
PC-1	Able to organize experiments (field trials) assessing the effectiveness of innovations technologies (elements of technology), varieties and hybrids under production conditions	Research work; Technological Training; Information Technology; Crop Production; Mechanization of Crop Production; Pests and Diseases; Soil Fertility Management;	
PC-2	Able to develop and implement environmentally friendly production techniques and technologies high quality products crop production taking into account the properties of agricultural landscapes and economic efficiency	Crop Production; Pests and Diseases; Technological Training; Research work;	
PC-3	Able to determine directions improvement and enhancement efficiency technologies for growing products plant growing based on scientific achievements, best practices of domestic and foreign manufacturers	Research work; Technological Training; Crop Production;	
PC-4	Capable of creating models of cultivation technologies agriculturalcrops, plant protection systems, varieties	Crop Production; Research work;	

* - filled in in accordance with the competency matrix and the SUP OP VO

** - elective disciplines/practices

4. SCOPE OF THE DISCIPLINE AND TYPES OF STUDY WORK

The total workload of the “Breeding and Seed Production” discipline is 7 credits.

Table 4.1. Types of educational work by periods of mastering the educational program of higher education for full-time education.

Type of academic work	**TOTAL,**ac.h.		**Semester(s)** 3	4
Contact work, academic hours	*116*		*68*	*48*
Lectures (LC)	58		34	24
Laboratory work (LW)	58		34	24
Practical/seminar classes (SZ)	0		0	0
Independent work of students, academic hours	*106*		*58*	*48*
Control (exam/test with assessment), academic hours	*30*		*18*	*12*
General complexity of the discipline	**ac.h.**	***252***	*144*	*108*
	credit. ed.	*7*	*4*	*3*

5. CONTENT OF THE DISCIPLINE

Table 5.1. Contents of the discipline (module) by types of academic work

Section number	Name of the discipline section	Section (Topic) Contents		Type of academic work*
Section 1	Selection as a science of breeding methods varieties and hybrids	1.1	Selection as a science and a branch of agricultural production. Implementation of achievements of selection in seed production.	LK, LR
		1.2	Economic importance of selection. The founders of domestic selection and outstanding breeders.	LK, LR
Section 2	The doctrine of variety	2.1	The concept of a variety and a heterotic hybrid. Morphological and economic biological characteristics and properties of the variety. Energy-saving and ecological function of the variety.	LK, LR
		2.2	Varieties of folk selection. Selective varieties.	LK, LR
		2.3	Variety and agricultural technology: cultivation on different agricultural backgrounds; variety as an effective protection against diseases and pests; the role of variety in increasing quality of agricultural products	LK, LR
Section 3	Source material in selection	3.1	The concept of the source material for selection. N.I. Vavilov, his role in the doctrine of the source material.	LK, LR
		3.2	Centers of origin of cultivated plants. Peasant varieties as source material for selection.	LK, LR
		3.3	World collections of VIR, their use. Gene banks.	LK, LR
Section 4	Hybridization	4.1	The concept of analytical and synthetic selection.	LK, LR
		4.2	Intraspecific hybridization. Selection of pairs for crossing. Methodology and technique hybridization.	LK, LR
		4.3	Distant hybridization. The importance and difficulties of distant hybridization. Methods of overcoming incompatibility in distant hybridization. Methods of genetic and chromosome engineering and biotechnology in distant hybridization	LK, LR
Section 5	Mutagenesis in plant breeding.	5.1	A Brief History of Mutation Breeding. The Role of Spontaneous Mutations in Breeding.	LK, LR
		5.2	Physical and chemical mutagens.	LK, LR
		5.3	Detection of mutants in self- and cross-pollinated and vegetatively propagated crops. Achievements and problems of mutant selection.	LK, LR
Section 6	Polyploidy and haploidy in plant breeding.	6.1	Obtaining autopolyploids for breeding purposes using colchicine and other agents.	LK, LR
		6.2	Reduced seed productivity autopolyploids and methods of its increase	LK, LR
		6.3	Methods of obtaining haploids. Importance haploidy in distant hybridization. Advantages of haploid selection.	LK, LR
		7.1	Main types of selection: Individual from homozygous populations in self-pollinators. Individual selection in cross-pollinators.	LK, LR

Section 7	Selection methods.	7.2	Mass selection in self-pollinators and cross-linked. Selection from cell populations. Selection on selective media.	LK, LR
Section 8	Population genetics	8.1	Genetic processes in populations	LK, LR
		8.2	genetic foundations of evolution. Factors of population dynamics	LK, LR
Section 9	Organization and technique of the selection process	9.1	Creation of populations; plant selection; progeny testing.	LK, LR
		9.2	Types of selection crops. Types of variety testing.	LK, LR
		9.3	Typicality, accuracy of the experiment and the principle of a single difference in selection process.	LK, LR
		9.4	Field work techniques. Sowing, care, observations, evaluations, culling and crop accounting.	LK, LR
Section 10	Selection of heterotic hybrids	10.1	Brief history of selection for heterosis. Types of heterotic hybrids using corn as an example.	LK, LR
		10.2	Combination ability. CMS and its use in obtaining hybrid seeds.	LK, LR
Section 11	State testing and protection of selection achievements	11.1	Tasks and organization of state variety testing. Methodology and technique of its implementation.	LK, LR
		11.2	The procedure for including varieties in the state. Variety testing and zoning of varieties. Criteria for the protectability of selection achievements: novelty, distinctiveness, homogeneity, stability. Variety testing network and its work	LK, LR
Section 12	Seed production as branch of agricultural production. Objectives and goals of seed production.	12.1	Organization of seed production in modern conditions. The Law of the Russian Federation "On selection achievements" and the Law of the Russian Federation "On "seed production".	LK, LR
		12.2	Variety change and variety renewal as the most important tasks of seed production	LK, LR
		12.3	Requirements for sowing and planting material. Standards (GOSTs) for sowing seed quality. Documentation of varietal crops and seeds. Varietal control. Field testing and registration of crops. Peculiarities of testing of individual crops. Methodology and technology testing.	LK, LR

* - filled in only for FULL-TIME education: LK – lectures; LR – laboratory work; PZ – practical/seminar classes.

6. LOGISTIC AND TECHNICAL SUPPORT OF DISCIPLINE

Table 6.1. Material and technical support of the discipline

Audience type	Equipping the auditorium	Specialized educational/laboratoryequipment, software and materials for mastering the discipline (if necessary)
Lecture	An auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; a board (screen) and technical equipment by means of multimedia presentations.	Specialized setfurniture; technical means: multimediaprojector EPSON EB-965,

Audience type	Equipping the auditorium	Specialized educational/laboratoryequipment, software and materials for mastering the discipline (if necessary)
		Laptop, Internet access. Software: Microsoft products (OS, office suite, including MS Office/Office 365, Teams, Skype)
Laboratory	An auditorium for laboratory work, individual consultations, ongoing monitoring and midterm assessment, equipped with a set of specialized furniture and equipment.	"A set of specializedfurniture, binocular microscope medical MIKMED-5, microscopic preparations Technical means: interactive board"
For independent work	A classroom for independent work of students (can be used for conducting seminars and consultations), equipped with a set of specialized furniture and computers with access to the EIS.	

* - the audience for independent work of students MUST be indicated!

7. EDUCATIONAL, METHODOLOGICAL AND INFORMATIONAL SUPPORT OF THE DISCIPLINE

Main literature:

1. General plant breeding / Yu. B. Konovalov, V. V. Pylnev, T. I. Khupatsaria, V. S. Rubets. - 5th ed., reprinted. - St. Petersburg: Lan, 2023. - 480 p. - ISBN 978-5-507-45737-3. - Text: electronic // Lan: electronic library system. - URL: https://e.lanbook.com/book/282386

2. Pylnev, V.V. Fundamentals of selection and seed production / V.V. Pylnev, A.N. Berezkin; Edited by: Pylnev V.V. - 2nd ed., erased. - St. Petersburg: Lan, 2023. - 216 p. — ISBN 978-5-507-45402-0. — Text: electronic // Lan: electronic library system. — URL: https://e.lanbook.com/book/267383

Further reading:

1. Practical training in selection and seed production of field crops: a textbook / V. V. Pylnev, Yu. B. Konovalov, T. I. Khupatsaria [et al.]. - St. Petersburg: Lan, 2022. — 448 p. — ISBN 978-5-8114-1567-0. — Text: electronic // Lan: electronic library system. — URL: https://e.lanbook.com/book/211478

2. Tsatsenko, L. V. Innovative technologies in agronomy: selection and seed production: a tutorial / L. V. Tsatsenko. - Krasnodar: KubSAU, 2020. - 88 p. — ISBN 978-5-907294-48-6. — Text: electronic // Lan: electronic library system. — URL: https://e.lanbook.com/book/171561

Resources of the information and telecommunications network "Internet":

1. RUDN University EBS and third-party EBSs to which university students have access

based on concluded agreements

- Electronic library system of RUDN - ELS RUDN http://lib.rudn.ru/MegaPro/Web
- Electronic library system "University library online"http://www.biblioclub.ru
- EBS Yuraithttp://www.biblio-online.ru
- Electronic Library System "Student Consultant"www.studentlibrary.ru
- Electronic library system "Troitsky Bridge"

2. Databases and search engines

- electronic fund of legal and normative-technical documentation http://docs.cntd.ru/
- Yandex search engine https://www.yandex.ru/
- Google search engine https://www.google.ru/
- SCOPUS abstract database http://www.elsevierscience.ru/products/scopus/

Educational and methodological materials for independent work of students mastering the discipline/module:*

1. A course of lectures on the subject "Breeding and seed production".

* - all educational and methodological materials for independent work of students are posted in accordance with the current procedure on the discipline page in TUIS!

8. EVALUATION MATERIALS AND SCORE-RATING SYSTEM FOR ASSESSING THE LEVEL OF DEVELOPMENT OF COMPETENCES IN THE DISCIPLINE

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

* - OM and BRS are formed on the basis of the requirements of the relevant local regulatory act of RUDN.

DEVELOPER:

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