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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

Crop 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 Agriculture

higher education programme profile/specialisation title

1. COURSE GOAL(s)

The purpose of mastering the discipline " Crop Production " is included in the master's degree program "General Agronomy" in the direction of 35.04.04 "Agronomy" and is studied in the 1st, 2nd, 3rd, 4th semesters of the 1st, 2nd courses. The discipline is implemented by the Agrobiotechnology Department. The discipline consists of 8 sections and 25 topics and is aimed at studying the biology of field crops and their cultivation.

The purpose of mastering the discipline is to develop theoretical knowledge on the biology of field crops and practical skills in the development and application of resource-saving technologies for their cultivation in various agro-landscape and environmental conditions.

2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the discipline " Crop Production " 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)
GC-1	Able to carry out a critical analysis of problematic situations based on a systematic approach, develop a strategy for action	GC-1.3 Develops a strategy for achieving a 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 participants in this activity;
GC-2	Able to manage a project at all stages of its life cycle	GC-2.3 Suggests possible ways (algorithms) of putting project results into practice (or implementing it)
OPK-1	Able to solve the tasks of developing the field of professional activity and (or) organization based on the analysis of scientific and industrial achievements	OPK-1.1 Demonstrates knowledge of the basic methods of analyzing scientific and industrial achievements in agronomy; OPK-1.3 Uses available technologies, including information and communication technologies, to solve the tasks of professional activity in agronomy;
OPK-2	Able to transfer professional knowledge based on pedagogical techniques	OPK-2.1 Knows modern educational technologies of vocational education (vocational training); OPK-2.2 Conveys professional knowledge in the field of agronomy, explains current problems and trends in its development, modern technologies for the production of crop production;
PC-1	Able to organize experiments (field experiments) to evaluate the effectiveness of innovative technologies (technology elements), varieties and hybrids in production conditions	PC-1.1 Develops a research program to study the effectiveness of innovative technologies (technology elements), varieties and hybrids, develops experimental methods, and develops new research methods;
PC-2	Able to develop and implement environmentally friendly techniques and technologies for the production of high-quality crop production, taking into account the properties of agricultural landscapes and economic efficiency	PC-2.1 Determines the planned crop yield based on available natural and industrial resources using generally accepted calculation methods; PC-2.2 Organizes quality and safety control of crop production;
PC-3	Able to identify areas for improving and increasing the efficiency of crop production technologies based on scientific achievements and best practices of domestic and foreign manufacturers.	PC-3.1 Identifies promising areas for improving the efficiency of crop production;

PC-4	Able to create models of crop cultivation technologies, plant protection systems, varieties;	PC-4.1 Creates models of crop cultivation technologies, plant protection systems, varieties
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3.COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

Mastering the discipline " Crop Production " is aimed at forming the following competencies (part of the competencies) among students:

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*
GC-1	Able to carry out a critical analysis of problematic situations based on a systematic approach, develop a strategy for action		
GC-2	Able to manage a project at all stages of its life cycle		
OPK-1	Able to solve the tasks of developing the field of professional activity and (or) organization based on the analysis of scientific and industrial achievements		
OPK-2	Able to transfer professional knowledge based on pedagogical techniques		
PC-1	Able to organize experiments (field experiments) to evaluate the effectiveness of innovative technologies (technology elements), varieties and hybrids in production conditions		
PC-2	Able to develop and implement environmentally friendly techniques and technologies for the production of high-quality crop production, taking into account the		

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
	properties of agricultural landscapes and economic efficiency		
PC-3	Able to identify areas for improving and increasing the efficiency of crop production technologies based on scientific achievements and best practices of domestic and foreign manufacturers.		
PC-4	Able to create models of crop cultivation technologies, plant protection systems, varieties;		

* 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 " Crop Production " is 18 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>		<i>314</i>	<i>102</i>	<i>72</i>	<i>85</i>	<i>55</i>
including:						
Lectures (LC)		114	34	24	34	22
Lab work (LW)						
Seminars (workshops/tutorials) (S)		200	68	48	51	33
<i>Self-studies</i>		<i>238</i>	<i>42</i>	<i>60</i>	<i>59</i>	<i>77</i>
<i>Evaluation and assessment (exam/passing/failing grade)</i>		<i>96</i>	<i>36</i>	<i>12</i>	<i>36</i>	<i>12</i>
Course workload	academic hours_	648	180	144	180	144
	credits	18	5	4	5	4

5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course module title	Course module contents (topics)	Academic activities types
Module 1: Theoretical foundations of crop production	1.1. Plant biology and conditions of genotype formation. Classification of field crops. Fundamentals of the physiological and genetic theory of yield: headlight resources and potential yield; solar energy storage and HEADLIGHT efficiency	LC; S
	1.2 Phytometric indicators of crops of a given productivity; determination of possible yields by moisture availability and thermal resources; agrochemical basics of crop programming	LC; S
Module 2: Grain crops of groups I and II	2.1 General characteristics of grain crops: morphology, biology, classification. The structure and chemical composition of grain. Features of organogenesis; phenology. The importance of heterotic and short-stemmed forms and varieties	LC; S
	2.2 Acreage and yield dynamics in the world and individual countries. Wheat taxonomy. Comparative biological and economic characteristics of soft and durum wheat. Spring and winter forms. Strong wheat. Winter wheat. Ways to increase winter hardiness. Features of plant growth in the autumn and spring-summer periods of vegetation. Technology of winter wheat cultivation. Zonal and varietal agricultural machinery of wheat. Winter wheat in irrigated agriculture	LC; S
	2.3 Spring and winter barley. The main directions in the cultivation and use of barley. Comparative characteristics of biology and methods of culture of spring and winter barley. Peculiarities of brewing barley cultivation	LC; S
	2.4 Corn. The most important food, fodder and technical culture. Agrotechnical significance of corn. The main areas of cultivation and productivity dynamics. Biological foundations of culture. Comparative biological and economic characteristics of the most important subspecies of corn. The technology of cultivation in various climatic zones when growing on grain and green mass. The role of hybrid forms in increasing the productivity and quality of corn grains. Combined corn crops with grain and leguminous crops.	LC; S
Module 3: Grain legumes	3.1 The role of grain legumes in increasing the production of vegetable protein for food and feed purposes. Agrotechnical importance of grain legumes. Distribution and productivity. Botanical and economic classification. Biological and ecological characteristics of grain legumes. Cultures of the temperate, subtropical and tropical	LC; S

Course module title	Course module contents (topics)	Academic activities types
	zones, comparative characteristics of cultural techniques	
	3.2 Soybeans. The importance of soybeans as a protein and oilseed crop. Dynamics of acreage and productivity, prospects for expansion in new, non-traditional areas (temperate zone). Botanical and biological characteristics. Features of zonal agricultural technology of culture	LC; S
	3.3 Beans. The origin and history of culture. Classification. Botanical and biological characteristics of the most important species of the new and old world. Features of agricultural machinery of certain types	LC; S
	3.4 Peas. Food and feed value. Cultivation areas. Botanical and biological characteristics. Culture techniques in various soil and climatic zones	LC; S
Module 4: Oilseed crops	4.1 National economic importance of oilseeds. Classification and botanical characteristics. Biochemical characteristics of vegetable oils. Areas of cultivation, acreage, yields of major oilseeds (average and potential)	LC; S
	4.2 Sunflower seeds. The origin and history of culture, distribution and productivity. Russia's priority for the oilseed sunflower crop. Botanical characteristics and classification. Biological features. The promotion of sunflowers in subtropical and tropical zones. Cultural techniques	LC; S
	4.3 Cruciferous oilseeds. Rapeseed, surepitsa (winter and spring forms), glaucous and white mustard. National economic importance. Distribution. Comparative morphological and biological characteristics. Features of agricultural technology of winter and spring forms.	LC; S
Module 5. Sugar-bearing crops	5.1 The most important sugar-bearing crops of the world. Distribution and importance in total gross sugar production. Perspective and economic efficiency	LC; S
	5.2 Sugar beet. Origin and distribution, botanical characteristics. Biological features. Comparative characteristics of factory and seed beet culture techniques	LC; S
Module 6: Starch-bearing crops	6.1 Starch-bearing crops are a source of carbohydrate nutrition. Botanical and economic classification. The reaction of plants to changing environmental conditions. Theory of tuber formation. Biochemical characteristics	LC; S

Course module title	Course module contents (topics)	Academic activities types
	6.2 Potatoes are the most important starch–bearing crop in the world. Origin, distribution, and productivity. Economic classification and biological features. The causes of potato degeneration and ways to obtain healthy planting material. Potato agrotechnics in various climatic zones	LC; S
Module 7: Fibrous crops	7.1 Cotton is the main fiber crop of the world. Origin. The main areas of culture and productivity. Quality indicators of cotton fiber. Botanical characteristics of the main cotton species. Biology of culture. Phases of development, features of flowering and fruit formation. Features of agricultural machinery	LC; S
	7.2 Flax is a fiber-oilseed crop. Areas of cultivation of long-lived flax and oilseed flax. Classification. Botanical and biological characteristics. Agrotechnics of flax and oilseed flax. Primary flax processing	LC; S
	7.3 Cannabis is a culture of universal use. Perspectives, morphology, biology and ecology of culture. Features of agricultural machinery and primary processing	LC; S
Module 8: Seed Science	8.1 Seed science as an independent science and its connection with crop production. Requirements for seed quality. Organization of seed control service in Russia and abroad. The structure of the International Association for Seed Control (ISTA), the participation of the State Seed Inspectorate of Russia in the work of ISTA	LC; S
	8.2 Formation and phases of seed development. Physiological and biochemical processes of seed filling and ripening. The relationship between the feeding and storage organs of plants. Seed diversity. Ecological and agrotechnical conditions for growing high-quality seeds	LC; S
	8.3 Morphological features and physical properties of seeds. Scientific foundations of seed purification. Methods of preparing seed material for sowing	LC; S
	8.4 Field germination of seeds and ways to increase it. The reasons affecting the field germination of seeds. Agrotechnics and field germination	LC; S
	8.5 Methods for determining the sowing qualities of seeds. Methods of sampling the average sample. The purity of the seeds. Fractional composition and weight of 1000 seeds. Laboratory germination and germination energy.	LC; S

Course module title	Course module contents (topics)	Academic activities types
	Viability of seeds. Crop shelf life. Registration of documents for seed quality	

* - 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	An auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; a blackboard (screen) and multimedia presentation equipment	
Scientific Laboratory	An auditorium for laboratory work, individual consultations, routine monitoring and intermediate certification, equipped with a set of specialized furniture and equipment.	
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. Crop production / V. E. Torikov, N. M. Belous, O. V. Melnikova, S. V. Artyukhova ; Edited by: V. E. Torikov — 2nd ed., ster. — Saint Petersburg : Lan, 2022. — 604 p. — ISBN 978-5-507-44799-2. — Text : electronic // Lan : electronic library system. — URL: <https://e.lanbook.com/book/243341>

2. Naumkin, V. N. Technology of crop production / V. N. Naumkin, A. S. Stupin. — 4th ed., erased. — Saint Petersburg : Lan, 2023. — 592 p. — ISBN 978-5-507-47819-4. — Text : electronic // Lan : electronic library system. — URL: <https://e.lanbook.com/book/327623>

Additional readings:

1. Vyugina, G. V. Fundamentals of ornamental crop production. Practicum : a textbook for universities / G. V. Vyugina, I. A. Karamulina, S. M. Vyugin. — 2nd ed., ster. — St. Petersburg : Lan, 2022. — 120 p. — ISBN 978-5-8114-9072-1. — Text : electronic // Lan : electronic library system. — URL: <https://e.lanbook.com/book/184081>

2. Workshop on technology of crop production: textbook / V. A. Shevchenko, I. P. Firsov, A.M. Solovyov, I. N. Gasparyan. — Saint Petersburg :

Lan, 2022. — 400 p. — ISBN 978-5-8114-1626-4. — Text : electronic // Lan : electronic library system. — URL: <https://e.lanbook.com/book/211640>

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 « Crop Production »

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

HEAD OF EDUCATIONAL DEPARTMENT:

name of department	name and surname
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HEAD OF HIGHER EDUCATION PROGRAMME:

position, department

name and surname