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**Federal State Autonomous Educational Institution of Higher Education  
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA  
RUDN University**

**Agrarian -Technological Institute**

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

**COURSE SYLLABUS**

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**History and methodology of scientific Agronomy**

course title

**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

**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 purpose of mastering the discipline "History and methodology of scientific Agronomy" is to master the competencies in the field of the history of agronomy as a science and methodology for obtaining scientific knowledge of the production of plant products for human nutrition, animal feeding and raw materials for industry.

## 2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the discipline "History and methodology of scientific Agronomy" 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)
GK-1	Able to carry out search, critical analysis of problem situations on the basis of a systematic approach, to develop an action strategy	GK-1.2. Uses a systematic approach to solve the tasks
		GK-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.
GK-5	Able to analyze and take into account the diversity of cultures in the process of intercultural interaction.	GK-5.1. Demonstrates an understanding of the characteristics of different cultures and nations.
		GK-5.2. Builds social interaction, taking into account the common and special different cultures and religions.
GK-6	Able to identify and implement the priorities of his own activities and ways to improve it on the basis of self-esteem	GK-6.1. Evaluates its resources and their limits (personal, situational, temporary), optimally uses them for the successful completion of the assigned task
		GK-6.2. Plans a professional trajectory, taking into account the peculiarities of both professional and other activities and the requirements of the labor market
OPK-2	Able to transfer professional knowledge taking into account pedagogical methods.	OPK-2.1. Transmits professional knowledge in the field of agronomy, explains current problems and trends in its development, modern technologies for the production of crop products
		OPK-2.2. Transfers professional knowledge in the field of agronomy, explains current problems and trends in its development, modern technologies for the production of crop products
PK-1	It is able to collect, process, analyze and systematize scientific and technical information, domestic and foreign experience in the field of agronomy.	PC-1.1. Carries out a critical analysis of the information received.
PK-4	It is able to prepare scientific and technical	PK-5.1. Compiles a research program to study the effectiveness of agricultural practices.

Competence code	Competence descriptor	Competence formation indicators (within this course)
	reports, reviews and scientific publications based on the results of the research performed.	PK-5.3. Able to correctly arrange the results obtained

### 3.COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

Mastering the discipline "History and methodology of scientific Agronomy" 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*
GK-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; History of Religions in Russia;
GK-5	Able to analyze and take into account the diversity of cultures in the process of intercultural interaction.		Organization of Integrated Plant Protection Systems; Instrumental methods of research; Plant immunity; Biotechnology in Plant Protection; Research Practice; Undergraduate practice / Преддипломная практика; Scientific research work / Научно-исследовательская работа;
GK-6	Able to identify and implement the priorities of his own activities and ways to improve it on the basis of self-esteem		Scientific research work / Научно-исследовательская работа; Research Practice;
OPK-2	Able to transfer professional knowledge taking into account pedagogical methods.		
PK-1	It is able to collect, process, analyze and systematize scientific		Scientific research work / Научно-исследовательская работа;

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
	and technical information, domestic and foreign experience in the field of agronomy.		Research Practice; Plant Quarantine; Biotechnology in Plant Protection; Organization of Integrated Plant Protection Systems; Plant immunity; Undergraduate practice / Преддипломная практика;
PK-4	It is able to prepare scientific and technical reports, reviews and scientific publications based on the results of the research performed.		Mathematical Modeling and Design; Scientific research work / Научно-исследовательская работа; Research Practice; Undergraduate practice / Преддипломная практика;

\* 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 "History and methodology of scientific Agronomy" is 5 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>		<b>51</b>	<b>51</b>			
<i>including:</i>						
Lectures (LC)		<b>17</b>	<b>17</b>			
Lab work (LW)						
Seminars (workshops/tutorials) (S)		<b>34</b>	<b>34</b>			
<i>Self-studies</i>		<b>102</b>	<b>102</b>			
<i>Evaluation and assessment (exam/passing/failing grade)</i>		<b>27</b>	<b>27</b>			
<b>Course workload</b>	academic hours_	<b>180</b>	<b>180</b>			
	credits	<b>5</b>	<b>5</b>			

#### 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 origins and stages of development of the theoretical foundations of scientific agronomy.	Topic 1.1. The emergence of scientific agronomy as a result of the appeal of natural science to the problems of deterioration of the food supply of the growing urban population. The main methods of empirical knowledge in agronomy. A one-factor experiment and its cognitive capabilities.	LC; S
	Topic 1.2. Research programs of the second half of the 20th century. The Golden Age of agronomy. Development of research based on a balanced cognitive model. Multifactorial experiments and their statistical and technical support. New methods of genetics and breeding. The birth of biotechnology and the creation of genetically modified plants	LC; S
	Topic 1.3. Специфика программ исследований многолетних и длительных полевых опытов. От сравнительного к идентификационному эксперименту. Практика как критерий истинности знаний. Расширение исследований в производственных условиях. Компьютерная революция 1960-2000 годов и информатика как основа обеспечения эффективности исследовательских программ в агрономии.	LC; S
Module 2: Methods of systematic research in agronomy.	Topic 2.1. Key concepts, their designation and meaning. Examples of erroneous definitions. Familiarization with logical categories and principles of correct thinking. Inductive and deductive conclusions. The concept of research in statics and dynamics. Methodology of comparative research. Comparative studies at the frequency level.	LC; S
	Topic 2.2. Requirements for the preliminary stage of research. Examples of the organization of preliminary studies of agrochemistry and agrophytocenology in conditions of normalized and directional heterogeneity. Familiarization with geostatistical research methods. Methods of organizing research based on GPS technology.	LC; S
	Topic 2.3. Methods of economic research in the examination of scientific programs and evaluation of research results. Modeling-based research programs. The concept of computer experimentation. The needs and ways of coordinating experimental schemes when creating dynamic models of agroecosystems. The concept of a systematic method (approach) of research.	LC; S
	Topic 2.4. Holism as the philosophical basis of the systemic method. Examples of solving agronomic problems using a systematic method.	LC; S

Course module title	Course module contents (topics)	Academic activities types
	Methods of research in statics: one by one, a set of signs. Research at different large-scale spatial levels. Research in dynamics: one by one, many features	
Module 3: Modern problems in agronomy and the main directions of the search for their solution The concept of a scientific problem and the justification of its solution methods	Topic 3.1. Modern scientific problems of agriculture. A hypothetical deductive research method. Formulation of the scientific (working) hypothesis of the study. The concept of a research plan and program. Cost planning for scientific research. Methodological features of calculating the effectiveness of the conducted research. Fundamentals of the theory and methodology of scientific and technical creativity.	LC; S
	Topic 3.2 The concept of an invention and the registration of an application for an invention. The need to strengthen scientific and technical creativity in agronomy. The nonlinear scientific paradigm, its conceptual content and conditions of acceptance.	LC; S
	Topic 3.3 Development of computer verification methods and the increasing role of computer experiment in research of farming systems. Comprehensive interdisciplinary research programs and modeling. New approaches and tools for the organization of measurements. The use of robots in experimental work. Nanotechnology and devices (technological component), political and socio-cultural spheres of research organization	LC; S
	Topic 3.4 New problems in agriculture. The limits of applicability of the methodology of evolutionism to modernity. Explanatory possibilities, boundaries. The danger of relying on the methodology of evolutionism in the design and forecasting of agricultural systems in unstable political and economic conditions. The possibilities of solving problems based on the philosophy of instability and nonlinear thinking	LC; S
	Topic 3.5 Features and requirements for scientific methods in the examination of technologies. Features of the organization and conduct of monitoring studies. Modern research programs in agronomy. Research programs on crop rotation, tillage, weed control, fertilization, sowing, care, cleaning	LC; S
Module 4: Course work/ project.	Topic 4.1. Historical aspects of the development of scientific agronomy Methodological approaches in the understanding and formation of scientific agronomy The role of a scientist in solving	

Course module title	Course module contents (topics)	Academic activities types
	emerging problems and tasks in the field of scientific agronomy	

\* - 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.	
Seminary	An auditorium for seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification, equipped with a set of specialized furniture and multimedia presentation 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. Agronomy /DOI 10.5772/intechopen.78102 Webshop link <https://www.intechopen.com/books> ISBN 9781838812232, 9781838812225, 9781838812249 Publisher IntechOpen Publisher website <https://www.intechopen.com/> Publication date and place 2020 Imprint intechOpen Classification Agronomy & crop production Pages 108

2. Osipova, G. S. The history and methodology of scientific gardening : a textbook / G. S. Osipova, L. N. Khayrova. — St. Petersburg : SPbGAU, 2020. — 102 p. — Text : electronic // Lan : electronic library system. — URL: <https://e.lanbook.com/book/191296>

### *Additional readings:*

1. Introduction to professional activity : a textbook for universities / V. A. Reimer, S. P. Knyazev, K. V. Zhuchaev, E. A. Romankova ; edited by V. A. Reimer. — St. Petersburg : Lan, 2024. — 232 p. — ISBN 978-5-507-48569-7. — Text : electronic // Lan : electronic library system. — URL: <https://e.lanbook.com/book/385865>

2. Methodology of science and modern problems in agronomy, agrochemistry and agro soil science : textbook / compiled by N. A. Ryabtseva [et al.]. — Persianovsky : Donskoy

State Agrarian University, 2021. — 183 p. — Text : electronic // Lan : electronic library system. — URL: <https://e.lanbook.com/book/216707>

#### *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/>

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 «History and methodology of scientific Agronomy»

\* 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
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