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

Soil Fertility Management
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

2025

1. COURSE GOAL(s)

The purpose of mastering the discipline " Soil Fertility Management " 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 9 sections and 21 topics and is aimed at studying the soil formation process, soil formation factors, soil genesis, soil structure, and fertility.

The purpose of mastering the discipline is to gain basic knowledge about the basic principles of the science of soil formation and the factors of soil formation, about the genesis of soils and their structure, about the composition and properties, about the patterns of their geographical distribution and the processes of interrelation with the environment, about their fertility and ways of rational use of soils in agricultural production.

2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the discipline " Soil Fertility Management " 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-1.1 Searches for the necessary information, critically analyzes it and summarizes the results of the analysis to solve the task.; 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-2.1 Develops a project concept within the framework of the identified problem, formulating goals, objectives, relevance, significance (scientific, practical, methodological and other, depending on the type of project), expected results and possible areas of their application;
GC-7	Able to search for the necessary sources of information and data, perceive, analyze, memorize and transmit information using digital means, as well as using algorithms when working with data obtained from various sources in order to effectively use the information received to solve problems, evaluate information, its reliability, and build logical conclusions based on incoming data	GC-7.2 Has practical experience in searching, perceiving, storing, analyzing, and transmitting information and data using digital means, algorithms and application programs for solving the tasks set;
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-1.2 Uses methods for solving problems of agronomy development based on the search and analysis of modern achievements of science and production; 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;

OPK-3	Able to use modern problem solving methods in the development of new technologies in professional activities	OPK-3.1 Analyzes methods and methods of solving problems in the development of new technologies in agronomy; OPK-3.2 Uses information resources, achievements of science and practice in the development of new technologies in agronomy;
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;

3.COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

Mastering the discipline " Soil Fertility Management " 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		
GC-7	Able to search for the necessary sources of information and data, perceive, analyze, memorize and transmit information using digital means, as well as using algorithms when working with data obtained from various sources in order to effectively use the information received to solve problems, evaluate information, its reliability, and build logical conclusions based on incoming data		

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
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		
OPK-3	Able to use modern problem solving methods in the development of new technologies in professional activities		
PC-1	Able to organize experiments (field experiments) to evaluate the effectiveness of innovative technologies (technology elements), varieties and hybrids in production conditions		

* 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 " Soil Fertility Management " is 16 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
Contact academic hours		171	*51*	*36*	*51*	*33*
including:						
Lectures (LC)		57	17	12	17	11
Lab work (LW)		114	34	24	34	22
Seminars (workshops/tutorials) (S)						
Self-studies		*345*	*111*	*60*	*75*	*99*
Evaluation and assessment (exam/passing/failing grade)		*60*	*18*	*12*	*18*	*12*
Course workload	academic hours_	**576**	**180**	**108**	**144**	**144**
	credits	**16**	**5**	**3**	**4**	**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: Introduction to soil science with the basics of geology	1.1 The subject and history of soil science with the basics of geology.	LC; LW
Module 2: Soil formation process and factors of soil formation	2.1 Soil formation, its place in the structure of the Earth's surface	LC; LW
	2.2 Factors of soil formation.	LC; LW
Module 3: Soil compositions	3.1 Phase composition of the soil. Granulometric composition of the soil	LC; LW
	3.2 Mineralogical and chemical compositions of the soil	LC; LW
	3.3 Organic composition of the soil. Biological phase of the soil	LC; LW
Module 4: Structure of the soil profile. Morphological features of the soil	4.1 The structure of the soil profile. Morphological features of the soil. Field survey of the soil profile	LC; LW
Module 5. Physico-chemical properties of the soil	5.1 Soil colloid. Soil absorption capacity	LC; LW
	5.2 Soil acidity and alkalinity. The buffering capacity of the soil	LC; LW
	5.3 Redox properties of soils. Enzymatic properties of soils	LC; LW
	5.4 Magnetic and radioactive properties of the soil. Instrumental examination of the soil cover	LC; LW
Module 6: Soil regimes	6.1 Water, air, thermal, chemical (IOD) soils.	LC; LW
Module 7: Soil fertility. Degradation of the soil cover. Agroecological characteristics	7.1 Soil fertility	LC; LW
	7.2 Soil erosion. Conditions and factors of soil cover degradation	LC; LW
	7.3 Agroecological characteristics of soils	LC; LW
Module 8: Genesis, classification, geography and agricultural use of soils	8.1 Classification of soils. Soil-geographical zoning	LC; LW
	8.2 Soils of the postlithogenic trunk	LC; LW
	8.3 Soils of the synlithogenic trunk	LC; LW
	8.4 Soils of the organogenic trunk. Incomplete (underdeveloped) soils, the trunk of chemogenic soils, outcrops and TPO	LC; LW
Module 9: Soil cartography and its practical application	9.1 Soil cartography, its tasks and research methods. Specialized soil maps	LC; LW
	9.2 Agricultural production grouping and soil bonification. Soil-ecological index and its calculation	LC; LW

* - 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. Kurbanov, S. A. Soil science with the basics of geology / S. A. Kurbanov, D. S. Magomedova. — 4th ed., erased. — Saint Petersburg : Lan, 2023. — 288 p. — ISBN 978-5-507-45740-3. — Text : electronic // Lan : electronic library system. — URL: https://e.lanbook.com/book/282395

2. Glukhykh, M. A. Soil fertility and its reproduction : a textbook for universities / M. A. Glukhykh. — 2nd ed., ster. — St. Petersburg : Lan, 2025. — 120 p. — ISBN 978-5-507-50563-0. — Text : electronic // Lan : electronic library system. — URL: https://e.lanbook.com/book/447377

Additional readings:

1. Bashkatova, L. N. Soil science. Practicum / L. N. Bashkatova, N. M. Nevenchannaya. — 2nd ed., erased. — Saint Petersburg : Lan, 2023. — 68 p. — ISBN 978-5-507-46200-1. — Text : electronic // Lan : electronic library system. — URL: https://e.lanbook.com/book/302207

2. Mamontov, V. G. Workshop on meliorative soil science / V. G. Mamontov. — 2nd ed., erased. — St. Petersburg : Lan, 2022. — 272 p. — ISBN 978-5-507-44334-5. — Text : electronic // Lan : electronic library system. — URL: https://e.lanbook.com/book/220496

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/
- 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 « Soil Fertility Management »

* 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

HEAD
OF HIGHER EDUCATION PROGRAMME:

position, department	name and surname