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

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 AGRONOMY
higher education programme profile/specialisation title

2024

1. THE GOAL OF MASTERING THE DISCIPLINE

The discipline "Soil Fertility Management" is included in the master's program "General Agronomy" in the direction 35.04.04 "Agronomy" and is studied in semesters 1, 2, 3, 4 of the 1st and 2nd years. The discipline is implemented by the Agrobiotechnology Department. The discipline consists of 9 sections and 21 topics and is aimed at studying the soil-forming process, soil-forming factors, soil genesis, soil structure, and fertility.

The purpose of mastering the discipline is to obtain basic knowledge about the fundamental principles of the science of the soil-forming process and soil-forming factors, 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 external environment, about their fertility and ways of rational use of soils in agricultural production.

2. REQUIREMENTS TO THE RESULTS OF MASTERING THE DISCIPLINE

Mastering the discipline "Soil Fertility Management" 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)
UK-1	Able to carry out critical analysis of problematic situations based on a systems approach, develop a strategy actions	UK-1.1 Performs a search for the necessary information, its critical analysis and generalizes the results of the analysis to solve the assigned task; UK-1.3 Develops a strategy for achieving a set goal as a sequence of steps, anticipating the result each of them and assessing their impact on the external environment planned activities and the relationships between the participants in these activities;
UK-2	Able to manage a project at all stages of its life cycle	UK-2.1 Develops a project concept within the framework of the identified 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-7	Able to search for the necessary sources of information and data, to perceive, analyze, remember and transmit information using digital means, as well as with the help of algorithms when working with data obtained from various sources in order to effectively use the information obtained to solve problems, to evaluate the information, its reliability, build logical conclusions based on incoming data information and data	UK-7.2 Has practical experience in searching, perception, storage, analysis, transmission of information and data using digital means, algorithms and application programs the purpose of solving the assigned tasks;
OPK-1	Capable of solving problems of development of the professional field activities and (or) organizations	OPK-1.1 Demonstrates knowledge of the basic methods of analyzing the achievements of science and production in agronomy; OPK-1.2 Uses methods for solving problems of agronomy

	based on the analysis of scientific achievements and production	development 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 problems of professional activity in agronomy;
OPK-2	Able to convey professional knowledge taking into account pedagogical methods	OPK-2.1 Knows modern educational technologies of professional education (professional training); OPK-2.2 Transfers professional knowledge in the field agronomy, explains current problems and trends in its development, modern technologies for the production of plant products;
OPK-3	Able to use modern methods of solving problems in the development of new technologies in professional activities	OPK-3.1 Analyzes methods and ways of solving problems in the development of new technologies in agronomy; OPK-3.2 Uses information resources, scientific achievements and practice in the development of new technologies 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;

3. PLACE OF DISCIPLINE IN THE STRUCTURE OF EDUCATIONAL EDUCATION

The discipline “Soil Fertility Management” is a mandatory part of Block 1 “Disciplines (modules)” of the higher education educational program.

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 "Soil Fertility Management".

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***
UK-7	Able to search for the necessary sources of information and data, to perceive, analyze, remember and transmit information using digital means, as well as using algorithms when working with data obtained from various sources for the purpose of effective use of the information obtained to solve problems, conduct an assessment of the information, its reliability, build		

Cipher	Name of competence	Preceding courses/modules, practices*	Subsequent disciplines/modules, practices*
	logicalconclusions on based on incoming information and data		
UK-2	Able to manage a project at all stages its life cycle		
UK-1	Capable of carrying out a critical analysis of problematic situations based on a systemic approach approach, develop a strategy of action		
OPK-1	Capable of solving problems of development of the professional field activities and (or) organizations based on analysis of scientific and industrial achievements		
OPK-2	Able to convey professional knowledge taking into account pedagogical methods		
OPK-3	Able to use modern methods of solving problems when development of new technologies in professional activities		
PC-1	Able to organize experiments (field trials) assessing the effectiveness of innovations technologies (elements of technology), varieties and hybrids in conditions production		

* - 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 discipline “Soil Fertility Management” is 16 credit units.

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)**			
			1	**2**	**3**	**4**
Contact work, academic hours	*290*		*85*	*60*	*85*	*60*
Lectures (LC)	116		34	24	34	24
Laboratory work (LW)	174		51	36	51	36
Practical/seminar classes (SZ)	0		0	0	0	0
Independent work of students, academic hours	*226*		*77*	*36*	*41*	*72*
Control (exam/test with assessment), academic hours	*60*		*18*	*12*	*18*	*12*
General complexity of the discipline	**ac.h.**	***576***	*180*	*108*	*144*	*144*
	credit. ed.	***16***	*5*	*3*	*4*	*4*

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	Introduction to Soil Science with Basics of Geology	1.1	The subject and history of soil science with the basics of geology.	LK, LR
Section 2	Soil-formingprocess and factors of soil formation	2.1	Formation of soil, its place in the structure of the earth's surface.	LK, LR
		2.2	Soil formation factors.	LK, LR
Section 3	Soil compositions.	3.1	Phase composition of soil. Granulometric composition of soil.	LK, LR
		3.2	Mineralogical and chemical composition of the soil.	LK, LR
		3.3	Organic composition of soil. Biological phase of soil	LK, LR
Section 4	Structure of the soil profile. Morphologicalsoil characteristics.	4.1	Structure of the soil profile. Morphological features of soil. Field survey of soil profile.	LK, LR
Section 5	Physicochemicalsoil properties.	5.1	Soil colloid. Absorption capacity of soil.	LK, LR
		5.2	Soil acidity and alkalinity. Buffering capacity of the soil.	LK, LR
		5.3	Oxidation-reduction properties of soils. Enzymatic properties of soils. Allopathic properties of soils.	LK, LR
		5.4	Magnetic and radioactive properties of soil. Instrumental survey of soil cover.	LK, LR
Section 6	Soil regimes.	6.1	Water, air, thermal, chemical (WAT) soil.	LK, LR
Section 7	Soil fertility. Soil cover degradation. Agroecological characteristics.	7.1	Soil fertility.	LK, LR
		7.2	Soil erosion. Conditions and factors of soil cover degradation.	LK, LR
		7.3	Agroecological characteristics of soils.	LK, LR
Section 8	Genesis, classification, geography and agriculturalsoil use.	8.1	Soil classification. Soil-geographical zoning.	LK, LR
		8.2	Postlithogenic trunk soils.	LK, LR
		8.3	Soils of synlithogenic trunk.	LK, LR
		8.4	Soils of the organogenic trunk. Incompletely developed soils, trunk of chemogenic soils, outcrops and TPO.	LK, LR
Section 9	Soil cartography and its practical application application.	9.1	Soil cartography, its tasks and methods research. Specialized soil maps.	LK, LR
		9.2	Agro-industrial group and Soil grading. Soil-ecological index and its calculation.	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: multimediaEPSON EB-965 projector, Laptop, Internet access. Software: Microsoft products (OS, office suite, incl. 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.	Specialized setfurniture; technical means: Levenhuk M1400 PLUS digital camera; Spectrophotometer Genesys 10S Vis, Thermo; Thermostat dry air SPU TS-1/80; Laminar flow box BAVnp-01-"Laminar-S" - 1.2 LORICA; Water distiller DE-4-02 EMO; Flame photometer Jenway PFP 7; STEAM STERILIZER KIUS; MicrocentrifugeM1324R; Pozis, Biryusa refrigerators; Heidolph Reax top test tube shaker; Allsheng MiniT-H2C thermostat; Centrifuge-vortex SM-70M-07; Tabletop centrifuge 5415 R Eppendorf; Mettler Toledo scales; Heidolph MR 3001 magnetic stirrer; Haier low-temperature freezer DW-86W100 (100l); PCR-

Audience type	Equipping the auditorium	Specialized educational/laboratoryequipment, software and materials for mastering the discipline (if necessary)
		box BAV-PCR-Laminar-C; Elf-4 power supply and electrophoresis chambers; Transilluminator ECX-15C; Thermocyclers Biometra Tgradient; DNA amplifier, gradient thermal block, TC1000-G; Mechanical homogenizer, Bioprep-6, Allsheng
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 Electronic Information System.	

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

7. EDUCATIONAL, METHODOLOGICAL AND INFORMATIONAL SUPPORT OF THE DISCIPLINE

Main literature:

1. Kurbanov, S. A. Soil Science with the Basics of Geology / S. A. Kurbanov, D. S. Magomedova. - 4th ed., reprinted. - St. 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. Lareshin V.G., Eroshkina A.N. Minerals, their diagnostics and role in soil formation. – M.: Publ. RUDN, 2000. – p. 123.

Further reading:

1. Bashkatova, L. N. Soil Science. Workshop / L. N. Bashkatova, N. M. Nevenchannaya. — 2nd ed., erased. - St. 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. Practical training in melioration soil science / V. G. Mamontov. — 2nd ed., reprinted. — 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

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. Lecture course on the subject "Soil Fertility Management".

* - 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 "Soil Fertility Management" is 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.

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