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**Federal state autonomous educational institution
higher education
Agrarian Technological Institute**

(The name of the main educational unit (MEU) - the developer of the educational program of higher education)

DISCIPLINE WORK PROGRAM

Landscape engineering and nature-based solution

(title of a discipline/module)

Recommended by the MSSN for the specialty:

35.04.09 Landscape architecture

(code and specialty name)

The study of the discipline is conducted within the framework of the basic professional educational program of higher education (EP HE):

Management and design of urban green infrastructure

(name of a specialization of the educational program)

2022 г.

1. GOAL OF THE DISCIPLINE

The goal of the discipline «Landscape engineering and nature-based solution» is to explore theoretical and applied issues of urban landscaping and beautification, as well as modern approaches to solving engineering and hydrological and urban environmental issues based on the principles of sustainable development.

2. REQUIREMENTS FOR THE RESULTS OF THE SKILLS ACQUISITION OF THE DISCIPLINE

Learning the discipline «Landscape engineering and nature-based solution» is aimed at the formation of students of the following competencies:

Table 2.1. The list of competencies formed in the development of the discipline (the results of the discipline)

Code	Competence	Indicators of competence achievement (within the discipline)
UK-1	Is able to search, critically analyze problem situations on the basis of a systematic approach, to develop a strategy of action.	UK-1.1 Able to apply systematization to solve tasks; UK-1.2 Able to search and analyze information.
UK-3	Able to organize and lead a team, developing a team strategy to achieve the goal.	UK-3.1 Able to organize team work on the project; UK-3.2 Able to interact with the executive authorities to coordinate all stages of the project.
UK-5	Is able to analyze and take into account the diversity of cultures in the process of intercultural interaction.	UK-5.1 Able to understand the features of the social organization of society, the specifics of the mentality and worldview of the cultures of the West and East; UK-5.2 Able to overcome the cultural barrier, perceiving intercultural differences.
UK-6	Is able to identify and implement the priorities of his/her own activities and ways to improve them on the basis of self-assessment.	UK-6.1 Able to plan their life activities for the period of study in an educational organization; UK-6.2 Is able to determine the tasks of self-development and professional growth, distribute them into long-term and short-term ones with justification of their relevance and determination of the necessary resources.
OPK-3	Is able to develop and implement new effective technologies in professional activity.	OPK-3.1 Able to implement new effective technologies in professional activities; OPK-3.2 Able to develop new effective

		technologies in professional activities.
OPK-4	Able to conduct scientific research, analyze results, and prepare reporting documents.	OPK-4.1 Capable of conducting scientific research; OPK-4.2 Able to prepare reporting documentation;
OPK-5	Is able to carry out a feasibility study of projects in professional activities.	OPK-5.1 Able to carry out economic feasibility study of projects; OPK-5.2 Able to carry out feasibility study of projects.
PK - 10	To be able to manage landscape architecture sites in terms of their functional use, protection and conservation.	PK – 10.1 Able to manage landscape architecture objects in the field of conservation and protection; PK – 10.2 Able to manage landscape architecture facilities.

3. THE PLACE OF THE DISCIPLINE IN THE STRUCTURE OF THE OP VO

The discipline “**Landscape engineering and nature-based solution**” refers to the basic part of the block B1 OP VO.

In the frame of the OP VO students also learning other disciplines and/or practices that contribute to the achievement of the planned results of acquiring skills in the discipline “**Landscape engineering and nature-based solution**”.

Table 3.1. List of components of the OP VO, contributing to the achievement of the planned results of acquiring skills in the discipline

Code	Description of the competence	Previous disciplines / modules, practices*	Subsequent disciplines/modules, practices*
UK-1	Is able to search, critically analyze problem situations on the basis of a systematic approach, to develop a strategy of action.	Phytopathology and Plant Protection Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)	International regulation in city planning and environmental protection Undergraduate practice

UK-3	Able to organize and lead a team, developing a team strategy to achieve the goal.	Phytopathology and Plant Protection Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)	International regulation in city planning and environmental protection Undergraduate practice
UK-5	Is able to analyze and take into account the diversity of cultures in the process of intercultural interaction.	Phytopathology and Plant Protection Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)	International regulation in city planning and environmental protection Undergraduate practice
UK-6	Is able to identify and implement the priorities of his/her own activities and ways to improve them on the basis of self-assessment.	Phytopathology and Plant Protection Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and	International regulation in city planning and environmental protection Undergraduate practice

		thesis preparation (in English)	
OPK-3	Is able to develop and implement new effective technologies in professional activity.		Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English) International regulation in city planning and environmental protection Undergraduate practice
OPK-4	Able to conduct scientific research, analyze results, and prepare reporting documents.		Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English) International regulation in city planning and environmental protection Undergraduate practice
OPK-5	Is able to carry out a feasibility study of projects in professional activities.		Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)

PK - 10	To be able to manage landscape architecture sites in terms of their functional use, protection and conservation.		Landscape planning and sustainable development Green infrastructure urban climate and carbon neutrality
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* - * - to be filled in accordance with the competence matrix SUP OP VO

4. COURSE SCOPE AND TYPES OF LEARNING ACTIVITIES

The credits of the “Landscape engineering and nature-based solution” amount 6 units.

Table 4.1. Types of educational work by periods of full-time study of the program of OP VO

Type of educational work	TOTAL, ac.h.	Semester
		1
<i>Classroom work, ac.h.</i>	34	34
<i>Including:</i>		
Lectures (LC)	17	17
Laboratory work (LW)	17	17
Practictice / seminars classes (P/S)		
<i>Individual work of students, ac.h.</i>	158	158
<i>Control (exam / pass with marks), ac.h.</i>	24	24
Total volume of the discipline	216	216
	credits	6

5. DISCIPLINE CONTENT

Table 5.1. Content of the discipline (module) by type of educational work

Sections	Topics	Type of educational work*
1. Natural landscape topography and artificial landforms	1.1 Natural Landscape topography – the base for landscape engineering and sustainable urban development (basic principles).	LC, LW
	1.2 Artificial landforms and their sustainability	LC, LW
	1.3 Geohazards: Assessment, prevention and mitigation practices	LC, LW
	1.4 Grey and green-blue solutions (NBS)).	LC, LW
2. Surface runoff in urban and natural/semi-natural environment	2.1 Surface runoff management;	LC, LW
	2.2 Erosion risk assessment and pollutions	LC, LW
3. General principles of Nature - based Solution	3.1 Sustainable development of the city's green framework: general principles and approaches.	LC, LW
	3.2 The landscape-ecological approach in urban planning - the scale of the city.	LC, LW
	3.3 The landscape-ecological approach in urban planning - the scale of the neighbourhood.	LC, LW
4. The integration of NBS into the city's urban planning	4.1 Nature-based solutions in urban landscaping.	LC, LW
	4.2 Urban water and green infrastructure: elements and design methods.	LC, LW
	4.3 Flood risk assessments and surface runoff minimisation.	LC, LW
	4.4 Green roofs as an element of water and green infrastructure.	LC, LW
	Final work project (theory and practice)	LC, LW

* - to be filled in only for full-time education: LC - lectures; LW - laboratory work; SR - seminars.

6. MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE

Table 6.1. Material and technical support of the discipline

Type of classroom	Classroom description	Specialized training/laboratory equipment, software and materials for learning the discipline (if necessary)
Classroom for lectures and practice	Rooms for laboratory work, individual consultations, taking exams and tests, equipped with a set of specialized equipments (r. 203, 418)	Draper Diplomat tripod screen 213x213 83", Workstation based on a system unit assembly and a monitor to work with graphics applications. Model AG_PC Axioma Group/Processor Intel Core I3 8 Co-Memory Crucial by Micron DDR4 8CV*2; Motherboard PRIME B360-PLUS; MoHHTop Samsung 23.5, Software ArchiCad 15, AutoCAD12, SketchUp, QGIS 2.10 (Quantum GIS)
Classroom for individual work of students	Room for individual work of students (can be used for laboratory classes and consultations), equipped with a set of specialized equipments (room 203, 418)	Draper Diplomat tripod screen 213x213 83", Workstation based on a system unit assembly and a monitor to work with graphics applications. Model AG_PC Axioma Group/Processor Intel Core I3 8 Co-Memory Crucial by Micron DDR4 8CV*2; Motherboard PRIME B360-PLUS; MoHHTop Samsung 23.5, Software ArchiCad 15, AutoCAD12, SketchUp, QGIS 2.10 (Quantum GIS)

* - the classroom for students' individual work is specified MUST!

7. METHODOLOGICAL AND INFORMATIONAL SUPPORT OF THE DISCIPLINE

The main literature:

1. Mary J. Thornbush and Casey D. Allen. Urban Geomorphology. Landforms and Processes in Cities. 2018. <https://doi.org/10.1016/C2016-0-02169-1>
2. Sowińska-Świerkosz B., García J. What are Nature-based solutions (NBS)? Setting core ideas for concept clarification //Nature-Based Solutions. 2022 (2) 100009. <https://doi.org/10.1016/j.nbsj.2022.100009>.
3. World Bank Climate Change and Adaptation: Nature-Based from the World Bank Portfolio, Biodiversity, Solutions Washington, DC, 2008 .

Additional literature:

4. Borradaile G. Understanding Geology Through Maps. 2014.
5. Beceiro P., Salgado Brito R., Galvão A. Assessment of the contribution of Nature-Based Solutions (NBS) to urban resilience: application to the case study of Porto //Ecological Engineering. 2022(175) 106489. <https://doi.org/10.1016/j.ecoleng.2021.106489>.
6. Dorst H., A. van der Jagt , R. Raven , H. Runhaar , Urban greening through nature-based

- solutions –key characteristics of an emerging concept, *Sustain. Cities Soc.* 49 (2019) 101620
7. Dumitru A., L. Wendling, *Evaluating the Impact of Nature-based Solutions: A Handbook For Practitioners*. d -G R&I, European Commission, Luxembourg, 2021, doi: 10.2777/244577 .
 8. Sowińska-Świerkosz B., García J. A new evaluation framework for nature-based solutions (NBS) projects based on the application of performance questions and indicators approach // *Science of The Total Environment*. 2021 (787) 147615. <https://doi.org/10.1016/j.scitotenv.2021.147615>.
 9. Turconi L., F. Faccini , A. Marchese , G. Paliaga , M. Casazza , Z. Vojinovic , F. Luino , *Implementation of nature-based solutions for hydro-meteorological risk reduction in small Mediterranean catchments: the case of portofino natural regional park, Italy, Sustainability* 12 (3) (2020) 1240 .

E-materials:

Resources of information and telecommunication network "Internet":

1. RUDN e-library:

RUDN electronic library system - RUDN EBS <http://lib.rudn.ru/MegaPro/Web>

University Library Online Libraries <http://www.biblioclub.ru>

Yurite electronic library system <http://www.biblio-online.ru>

Student's Consultant electronic library system www.studentlibrary.ru

Lan LBS <http://e.lanbook.com/> 2.

2. Databases and search engines:

NCBI: <https://p.360pubmed.com/pubmed/>

RUDN Bulletin: access mode from the RUDN territory and remotely <http://journals.rudn.ru/>

Elibrary.ru scientific library: access via RUDN IP-addresses at: <http://www.elibrary.ru/defaultx.asp>

ScienceDirect (ESD), FreedomCollection, Cell Press of Elsevier Publishing House. There is remote access to the database, access via RUDN IP-addresses (or remotely via individual login and password).

Google Scholar is a free search engine for full-text scientific publications of all formats and disciplines. Indexes the full texts of scientific publications. Access mode: <https://scholar.google.ru/>

Scopus is a scientometric database of Elsevier Publishing House. Access to the platform is via IP-addresses of PFUR or remotely. <http://www.scopus.com/>

Educational and methodological materials for students' individual work for acquiring skills discipline/module:*

1. Theoretical and practical information in the presentations «**Landscape engineering and nature-based solution**»

2. Practical tasks

* - all educational and methodical materials for students' individual work are placed in TUIS

8. EVALUATION METHODS AND SCORE-RATING SYSTEM FOR ASSESSING THE LEVEL OF COMPETENCE IN THE DISCIPLINE

Assessment materials (AM) and score-rating system* (SRS) for assessing the level of competence (part of competences) for the "**Landscape engineering and nature-based solution**" discipline are presented in the Supplementary to this Work program of the discipline.

* - AM and SRS are formed on the basis of the requirements of the corresponding of the regulatory documents of the RUDN University.

DEVELOPERS:

Associate Professor of the
Department of Landscape Design
and Sustainable Ecosystems

Position, BTU



Signature

V.I. Vasenev

Name

HEAD OF THE BTU

Director of the Department of
Landscape Design and Sustainable
Ecosystems

Position, BTU



Signature

E.A. Dovletyarova

Name

РУКОВОДИТЕЛЬ ОП ВО:

Director of the Department of
Landscape Design and Sustainable
Ecosystems

Position, BTU



Signature

E.A. Dovletyarova

Name