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ФИО: Ястребов Олег Александрович  
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**Federal State Autonomous Educational Institution of Higher Education**

**PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA**

**NAMED AFTER PATRICE LUMUMBA (RUDN University)**

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**Agrarian and Technological Institute**

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

**COURSE SYLLABUS**

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Landscape engineering and nature-based solution

course title

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**Recommended by the Didactic Council for the Education Field of:**

35.03.09 Landscape architecture

Management and design of urban green infrastructure

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field of studies / speciality code and title

**The course instruction is implemented within the professional education programme of higher education:**

Landscape architecture

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higher education programme profile/specialisation title

## 1. COURSE GOAL(s)

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, hydrological and urban environmental issues based on the principles of sustainable development.

## 2. REQUIREMENTS FOR LEARNING OUTCOMES

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)*

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Competence formation indicators (within this course)</b>
GK-1	Student is able to search, critically analyze problem situations based on a systematic approach, to develop a strategy of action.	GK-1.1 Student is able to apply systematization to solve tasks; GK-1.2 Student is able to search and analyze information.
GK-3	Student is able to organize and lead a team, developing a team strategy to achieve the goal.	GK-3.1 Student is able to organize team work on the project; GK-3.2 Student is able to interact with the executive authorities to coordinate all stages of the project.
GK-5	Student is able to analyze and take into account the diversity of cultures in the process of intercultural interaction.	GK-5.1 Student is 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; GK-5.2 Student is able to overcome the cultural barrier, perceiving intercultural differences.
GK-6	Student is able to identify and implement the priorities of his/her own activities and ways to improve them based on self-assessment.	GK-6.1 Student is able to plan their life activities for the period of study in an educational organization; GK-6.2 Student 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.
GPC-3	Student is able to develop and implement new effective technologies in professional activity.	GPC-3.1 Student is able to implement new effective technologies in professional activities; GPC-3.2 Student is able to develop new effective technologies in professional activities.
GPC-4	Student is able to conduct scientific research, analyze results, and prepare reporting documents.	GPC-4.1 Capable of conducting scientific research; GPC-4.2 Student is able to prepare reporting documentation;
	Student is able to carry out a feasibility study of	GPC-5.1 Student is able to carry out economic feasibility study of projects;

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Competence formation indicators (within this course)</b>
GPC-5	projects in professional activities.	GPC-5.2 Student is able to carry out feasibility study of projects.
PC - 10	Student is able to manage landscape architecture sites in terms of their functional use, protection and conservation.	PC-10.1 Student is able to manage landscape architecture objects in the field of conservation and protection; PC-10.2 Student is able to manage landscape architecture facilities.

### 3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The discipline “Landscape engineering and nature-based solution” refers to the variable component of (B1) block B1 of the higher educational programme curriculum.

*Table 3.1. The list of the higher education programme components that contribute to the achievement of the expected learning outcomes as the course results.*

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Previous courses/modules, Courses*</b>	<b>Subsequent courses/modules, Courses*</b>
GK-1	Student is able to search, critically analyze problem situations based on a systematic approach, to develop a strategy of action.	Data analysis and statistics; International regulation in city planning and environmental protection; Landscape planning and sustainable development; Green infrastructure urban climate and carbon neutrality; Scientific writing skills; Research planning; Scientific research.	-
GK-3	Student is able to organize and lead a team, developing a team strategy to achieve the goal.	Data analysis and statistics; International regulation in city planning and environmental protection; Landscape planning and sustainable development; Green infrastructure urban climate and carbon neutrality; Urban ecology; Scientific writing skills.	-
GK-5	Student is able to analyze and take into account the diversity of cultures in the process of intercultural interaction.	Data analysis and statistics; International regulation in city planning and environmental protection; Landscape planning and	-

Competence code	Competence descriptor	Previous courses/modules, Courses*	Subsequent courses/modules, Courses*
		sustainable development; Green infrastructure urban climate and carbon neutrality; Scientific writing skills; Research planning; Scientific research.	
GK-6	Student is able to identify and implement the priorities of his/her own activities and ways to improve them based on self-assessment.	Data analysis and statistics; International regulation in city planning and environmental protection; Landscape planning and sustainable development; Green infrastructure urban climate and carbon neutrality; Urban ecology; Scientific writing skills; Research planning; Scientific research.	-
GPC-3	Student is able to develop and implement new effective technologies in professional activity.	Data analysis and statistics; International regulation in city planning and environmental protection; Landscape planning and sustainable development; Urban ecology; Scientific writing skills; Research planning; Scientific research.	-
GPC-4	Student is able to conduct scientific research, analyze results, and prepare reporting documents.	Data analysis and statistics; International regulation in city planning and environmental protection; Landscape planning and sustainable development; Scientific writing skills; Research planning; Scientific research.	-

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Previous courses/modules, Courses*</b>	<b>Subsequent courses/modules, Courses*</b>
GPC-5	Student is able to carry out a feasibility study of projects in professional activities.	Data analysis and statistics; International regulation in city planning and environmental protection; Landscape planning and sustainable development; Scientific writing skills; Research planning; Scientific research.	-
PC - 10	Student is 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.	-

#### **4. COURSE WORKLOAD**

The total workload of the course is 6 credits (216 academic hours).

#### **5. COURSE CONTENTS**

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

<b>Modules</b>	<b>Contents (topics, types of practical activities)</b>	<b>Workload, academic hours</b>
1. Natural landscape topography and artificial landforms	1.1 Natural Landscape topography – the base for landscape engineering and sustainable urban development (basic principles).	13
	1.2 Artificial landforms and their sustainability	
	1.3 Geohazards: Assessment, prevention and mitigation practices	
	1.4 Grey and green-blue solutions (NBS)).	
2. Surface runoff in urban and natural/semi-natural environment	2.1 Surface runoff management;	11
	2.2 Erosion risk assessment and pollutions	
3. General principles of Nature - based Solution	3.1 Sustainable development of the city's green framework: general principles and approaches.	13
	3.2 The landscape-ecological approach in urban planning - the scale of the city.	

	3.3 The landscape-ecological approach in urban planning - the scale of the neighbourhood.	
4. The integration of NBS into the city's urban planning	4.1 Nature-based solutions in urban landscaping.	14
	4.2 Urban water and green infrastructure: elements and design methods.	
	4.3 Flood risk assessments and surface runoff minimisation.	
	4.4 Green roofs as an element of water and green infrastructure.	
Independent work of students.		133
Control (exam/test with assessment).		32
<b>TOTAL:</b>		<b>216</b>

## 6. COURSE EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

The infrastructure and technical support necessary for the course implementation include: certified soil-ecological laboratory, individual consultations, routine monitoring and interim certification, equipped with a set of specialized furniture and equipment. (rooms 203, 418). Specialized educational/laboratory equipment includes Draper Diplomat 213x213 83” tripod screen, a workstation based on a complete system unit and a monitor for working with graphical applications. Model AG\_PC Axiom Group/Intel Core I3 Processor 8 Cooperative memory Crucial by Micron DDR4 8SV\*2;Motherboard PRIME B360-PLUS; MoHHTop Samsung 23.5, Software ArchiCAD 15, AutoCAD12, SketchUp, QGIS 2.10 (Quantum GIS).

## 7. RESOURCES RECOMMENDED FOR COURSE

### *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](http://www.studentlibrary.ru)

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

**8. ASSESSMENT TOOLKIT AND GRADING SYSTEM\* FOR EVALUATION OF STUDENTS' COMPETENCES LEVEL AS COURSE RESULTS**

The assessment toolkit and the grading system\* to evaluate the level of competences (competences in part) formation as the course results are specified in the Appendix to the course syllabus.

\* The assessment toolkit and the grading system are formed based on the requirements of the relevant local normative act of RUDN University (regulations / order).

**DEVELOPERS:**

Associate Professor,  
department of landscape  
planning and sustainable  
ecosystems



**V. I. Vasenev**

position, educational department

signature

name and surname.

**HEAD OF EDUCATIONAL DEPARTMENT:**

Director, department of  
landscape planning and  
sustainable ecosystems



**E. A. Dovletyarova**

educational department

signature

name and surname.

**HEAD OF  
HIGHER EDUCATION PROGRAMME:**

Associate Professor,  
department of landscape  
planning and sustainable  
ecosystems



**V. I. Vasenev**

position, educational department

signature

name and surname