Federal State Autonomous Educational Institution of Higher Education "Peoples' Friendship University of Russia"

Agrarian and Technological Institute

(name of the main educational unit-developer of the EP HE)

PROGRAM OF THE DISCIPLINE

Advances in environmental monitoring

(name of the discipline/module)

Recommended by the ISSN for the direction of training/specialty:

35.04.09 Landscape architecture

Management and design of urban green infrastructure

(code and name of the direction of training/specialty)

The development of the discipline is carried out within the framework of the implementation of the main professional educational program of higher education:

Landscape architecture

(name (profile/specialization) of the EP HE)

2022 г.

1. THE AIM OF MASTERING THE DISCIPLINE

The aim of discipline «Advances in environmental monitoring» is to provide solid fundamental knowledge and advanced skills in monitoring urban ecosystems, including air quality and climate, water quality, soil quality and tree health.

2. REQUIREMENTS FOR THE RESULTS OF MASTERING THE DISCIPLINE

The development of the discipline **"Advances in environmental monitoring"** is aimed at the formation of the following competencies among students:

Table 2.1. List of competencies formed by students during the development of the discipline (results of the development of the discipline)

Code	Competency	**Indicators of competence achievement** (within the framework of this discipline)
UC-1	Student is able to search, critically analyze problem situations based on a systematic approach, and develop a strategy for action	UC1.1 student is able to apply systematization to solve tasks; UC-1.2 Student is able to search and analyze information;
UC-3	Student is able to organize and manage the work of the team, developing a team strategy to achieve the goal	UC-3.1 Student is able to organize team work on the project; UC-3.2 student is able to interact with the executive authorities to coordinate all stages of design;
UC-5	Student is able to analyze and take into account the diversity of cultures in the process of intercultural interaction	UC-5.1 Student is able to understand the peculiarities of the social organization of society, the specifics of the mentality and worldview of the cultures of the West and East; UC-5.2 Student is able to overcome the cultural barrier, perceiving cross-cultural differences;
UC-6	Student is able to determine and implement the priorities of his own activities and ways to improve it based on self-assessment	UC-6.1 "Student is able to plan his life activities for the period of study in an educational organization"; UC6.2 Student is able to determine the tasks of self-development and professional growth, distribute them for long-medium- and short-term with justification of their relevance and determination of the necessary resources;
PC-24	Readiness to develop (based on current standards) methodological and regulatory documents for the design of landscape architecture objects	PC-24.1 Is able to prepare a report on the conduct of EES; PC-24.2 is able to conduct environmental surveys;

3. THE PLACE OF DISCIPLINE IN THE STRUCTURE OF THE EP HE

The discipline **"Advances in environmental monitoring"** belongs to the basic part of the block B1 of the EP HE.

Within the framework of the educational program, students also master other disciplines and/or practices that contribute to achieving the planned results of mastering the discipline «**Advances in environmental monitoring**».

Table 3.1. The list of the components of the educational program that contribute to the achievement of the planned results of the development of the discipline

Code	**Competency**	**Previous disciplines/modules, practices***	**Subsequent disciplines/modules, practices***
UC-1	Student is able to search, critically analyze problem situations based on a systematic approach, and develop a strategy for action		Data analysis and statistics International regulation in city planning and environmental protection Landscape planning and sustainable development Scientific writing skills Scientific research and thesis preparation (in English)
UC-3	Student is able to organize and manage the work of the 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 Urban ecology Scientific writing skills Scientific research and thesis preparation (in English)
UC-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 sustainable development Scientific writing skills Scientific research and thesis preparation (in English)
UC-6	Student is able to determine and implement the priorities of his own activities and ways to improve it based on self-assessment		Data analysis and statistics International regulation in city planning and environmental protection Landscape planning and sustainable development Urban ecology Scientific writing skills Scientific research and thesis preparation (in English)
PC-24	Readiness to develop (based on current standards) methodological and regulatory documents for		International regulation in city planning and environmental protection

	the design of landscape architecture objects		

* - filled in in accordance with the matrix of competencies and SC EP HE

4. SCOPE OF DISCIPLINE AND TYPES OF ACADEMIC WORK

The total labor intensity of the discipline **"Advances in environmental monitoring"** is 6 credits.

*Table 4.1. Types of educational work by periods of mastering the OP in for **FULL-time** education*

Type of educational work		**TOTAL,** ac.h	**Semesters**			
			1	**2**		
Contact work, ac.h		**60**	**34**	**26**		
Including:						
Lectures (**LC**)		30	17	13		
Laboratory works *(***LW***)*		30	17	13		
Practical/seminar classes (**SC**)						
Independent work of students, ac.h		114	53	61		
Control (exam/test with assessment), ac.h		42	21	21		
Total labor intensity of the discipline	Ac. hours	**216**	**108**	**108**		
	credits	**6**	**3**	**3**		

5. CONTENT OF THE DISCIPLINE

Table 5.1. The content of the discipline (module) by type of academic work

Name of the discipline section	**Content of the section (topics)**	**Type of educational work***
1.Principles of environmental monitoring and assessment	1.1 Monitoring urban environment: why and how? 1.2 Searching for monitoring data in your area	**LC, LW**
2. Climate and air quality monitoring	2.1 Urban climate: from monitoring to modeling 2.2 Monitoring urban climate (joined with GI & UC) 2.3 Monitoring air quality 2.4 Assessing pathogenic microbes in particle matters 2.5 Control work on section 2	**LC, LW**
3. Monitoring soil quality and soil health	3.1 Monitoring soil pollution by conventional and express methods 3.2 Estimating soil pollution indexes 3.3 Microbial indicators to assess urban soil health and ecosystem services 3.4 Measuring and assessing microbial activity and functional diversity in Technosols 3.5 Biological pollution of urban soils	**LC, LW**

	3.6 Assessing pathogenic microbes in urban soils 3.7 Interactions between air quality and soil quality 3.8 Control work on section 3 3.9 Intermediate control work	
4. Monitoring water quality	4.1 Monitoring water pollution and water quality 4.2 Assessing quality of drinking water	**LC, LW**
5. Monitoring urban green infrastructures	5.1 Monitoring tree health by VTA 5.2 Comparing VTA protocols for Russia and Italy 5.3 Monitoring urban green infrastructure by remote sensing 5.4 Assessing UGI availability and accessiblity based on RS 5.5 Monitoring urban green infrastructure by IoT 5.6 Estimating UGI ecosystem services based on the real-time monitoring data 5.7 Control work on section 5	**LC, LW**
6. Monitoring noice and soundscape	6.1 Urban soundscape 6.2 Monitoring noice pollution 6.3 Acoustic methods to monitor biodiversity in urban ecosystems 6.4 Monitoring birds by audiomols	**LC, LW**
7. Citizen science	7.1 Citizen science for urban environmental monitoring 7.2 Assessing air quality and microclimte based on citizen science network 7.3 Final control work	**LC, LW**

* - it is filled in only by **FULL–time** education: LC – lectures; LW – laboratory work; SC - seminars.

6. MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE

Table 6.1. Material and technical support of the discipline

Audience type	**Equipping the audience**	**Specialized educational/laboratory equipment, software and materials for the development of the discipline (if necessary)**
Specialized audience	An auditorium for laboratory work, individual consultations, routine monitoring and interim certification, equipped with a set of specialized furniture and equipment. (audiences 203, 418)	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,

Audience type	Equipping the audience	Specialized educational/laboratory equipment, software and materials for the development of the discipline (if necessary)
		Software ArchiCAD 15, AutoCAD12, SketchUp, QGIS 2.10 (Quantum GIS)
For independent work of students	An auditorium for laboratory work, individual consultations, routine monitoring and interim certification, equipped with a set of specialized furniture and equipment. (audiences 203, 418)	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)

* - the audience for independent work of students is called **MANDATORY**!

7. EDUCATIONAL, METHODOLOGICAL AND INFORMATIONAL SUPPORT OF THE DISCIPLINE

The main literature:

1. Kurbatova A.S., Bashkin V.N., Kasimov N.S. «Urban ecology». – M.: 2004 – 624 p (in Russian)
2. Denisov V.V., Kurbatova A.S., Denisova I.A., Bondarenko V.L., Gracheva V.A., Gutenev V.V., Nagnibeda B.A. «Ecology of a city». M.: Rostov on Don: 2008-832 p.(in Russian).
3. Alberti M. Advances in Urban Ecology: Integrating Humans and Ecological Processes in Urban Ecosystems Springer; 2008 366 p.
4. Marzluff et al (eds) 2008. Urban ecology. Springer. USA.
5. Vasenev V., Epikhina A. Urban ecology. Educational-methodological complex for master students. RUDN University, 2015.

Additional literature:

1. Urban Informatics. Wenzhong Shi, Michael F. Goodchild, Michael Batty, Mei-Po Kwan, Anshu Zhang (Eds.). Springer Singapore, 2021.
2. Forman R. Urban ecology: Science of Cities. 2014.
3. Urban Ecology. Pramit Verma, Pardeep Singh, Rishikesh Singh, A. Raghubanshi (Eds.). 2020

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 «**Advances in environmental monitoring**» discipline in the presentations and Educational-methodological complex for master students.

2. Practical tasks

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

8. EVALUATION MATERIALS AND A POINT-RATING SYSTEM FOR ASSESSING THE LEVEL OF COMPETENCE FORMATION IN THE DISCIPLINE

Evaluation materials and a point-rating system* for assessing the level of competence formation (part of competencies) based on the results of mastering the discipline **"Advances in environmental monitoring"** are presented in the Appendix to this Work Program of the discipline.

* - EM and PRS are formed on the basis of the requirements of the relevant local regulatory act of the RUDN.

DEVELOPERS:

Associate Professor of the Department of Landscape Design and Sustainable Ecosystems		V.I. Vasenev
Position, BTU	Signature	Name

HEAD OF THE BTU

Director of the Department of Landscape Design and Sustainable Ecosystems		E.A. Dovletyarova
Position, BTU	Signature	Name

РUСОВОДИТЕЛЬ ОП ВО:

Director of the Department of Landscape Design and Sustainable Ecosystems		E.A. Dovletyarova
Position, BTU	Signature	Name