Federal State Autonomous Educational Institution of Higher Education

**PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
NAMED AFTER PATRICE LUMUMBA**

Agrarian and Technological Institute

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

COURSE SYLLABUS

Advances in environmental monitoring

course title

Recommended by the Didactic Council for the Educatioвn Field of:

35.04.09 Landscape architecture
Management and design of urban green infrastructure

field of studies / speciality code and title

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

Landscape architecture

higher education programme profile/specialisation title

1. COURSE GOAL(s)

The goal of course 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 LEARNING OUTCOMES

The development of the discipline is aimed at the formation of the following competencies among students:

Table 2.1. List of competencies that students acquire during the course

Competence code	Competency descriptor	Competence formation indicators (within this course)
UC-1	Student is able to search, critically analyze problem situations based on a systematic approach, and develop a strategy for action	UC-1.1 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 crosscultural 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; UC-6.2 Student is able to determine the tasks of selfdevelopment 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 Student is able to prepare a report on the conduct of EES; PC-24.2 Student is able to conduct environmental surveys;

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The discipline refers to the variable component of (B1) block B1 of the higher educational programme curriculum.

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.

Competence code	Competence descriptor	Previous courses/modules, courses*	Subsequent courses/modules, courses*
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; Green infrastructure urban climate and carbon neutrality; Scientific writing skills; Research planning; Scientific research.	-
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; Green infrastructure urban climate and carbon neutrality; Urban ecology; Scientific writing skills; Research planning; Scientific research.	-
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; Green infrastructure urban climate and carbon neutrality; Scientific writing skills; Research planning; Scientific research.	-
UC-6	Student is able to determine and implement the priorities of his own activities and ways to improve it based on selfassessment	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.	-
PC-24	Readiness to develop (based on current tandards) methodological and regulatory documents for the design of landscape architecture objects	International regulation in city planning and environmental protection; Research planning.	-

* To be filled in according with the competence matrix of the higher education programme.

4. COURSE WORKLOAD
The total workload of the discipline is 6 credits (216 academic hours).

5. COURSE CONTENTS

Table 5.1. The discipline contents

Modules	Contents (topics, types of practical activities)	Workload, academic hours
1.Principles of environmental monitoring and assessment	1.1 Monitoring urban environment: why andhow? 1.2 Searching for monitoring data in your area	2
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 particlematters 2.5 Control work on section 2	2
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 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	3
4. Monitoring water quality	4.1 Monitoring water pollution and waterquality 4.2 Assessing quality of drinking water	2
5. Monitoring urban green infrastructures	5.1 Monitoring tree health by VTA 5.2 Comparing VTA protocols for Russia andItaly 5.3 Monitoring urban green infrastructure byremote sensing 5.4 Assessing UGI availability and accessiblitybased on RS 5.5 Monitoring urban green infrastructure byIoT 5.6 Estimating UGI ecosystem services basedon the real-time monitoring data 5.7 Control work on section 5	2
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	2
7. Citizen science	7.1 Citizen science for urban environmental monitoring 7.2 Assessing air quality and microclimtebased on citizen science network 7.3 Final control work	2
Independent work of students		153
Control (exam/test with assessment)		48
TOTAL:		216

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.   Kurbatova A.S., Bashkin V.N., Kasimov N.S. «Urban ecology». – M.: 2004 – 624 p (inRussian)
2.   Denisov V.V., Kurbatova A.S., Denisova I.A., Bondarenko V.L., Gracheva V.A., GutenevV.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 inUrban 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 masterstudents. RUDN University, 2015.

Additional literature:
1.   Urban Informatics. Wenzhong Shi, Michael F. Goodchild, Michael Batty, Mei-Po Kwan, AnshuZhang (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.ruLan 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. 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		**K. V. Ivashchenko**
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 |