Federal State Autonomous Educational Institution of Higher Education

PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA

NAMED AFTER PATRICE LUMUMBA (RUDN University)

Agrarian Technological Institute

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

COURSE SYLLABUS

Principles of remote sensing and modeling

course title

Recommended by the Didactic Council for the Education 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 the discipline «Principles of remote sensing and modeling» is to obtain basic theoretical knowledge and practical skills in application of spatial data for quantitative assessments of Earth surface properties and environmental management.

2. REQUIREMENTS FOR LEARNING OUTCOMES

Learning the discipline «Principles of remote sensing and modeling» 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)

Competence code	Competence descriptor	Competence formation indicators (within this course)
GC-1	Student is able to search, critically analyze problem situations based on a systematic approach, to develop a strategy of action.	GC-1.1 Student is able to apply systematization to solve tasks; GC-1.2 Student is able to search and analyze information.
GC-3	Student is able to organize and lead a team, developing a team strategy to achieve the goal.	GC-3.1 Student is able to organize team work on the project; GC-3.2 Student is able to interact with the executive authorities to coordinate all stages of the project.
GC-5	Student is able to analyze and take into account the diversity of cultures in the process of intercultural interaction.	GC-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; GC-5.2 Student is able to overcome the cultural barrier, perceiving intercultural differences.
GC-6	Student is able to identify and implement the priorities of his/her own activities and ways to improve them based on self-assessment.	GC-6.1 Student is able to plan their life activities for the period of study in an educational organization; GC-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-1	Student is able to analyze modern problems of science and production, solve complex (non-standard) tasks in professional activities.	GPC-1.1 Student is able to solve complex (non-standard) tasks in professional activities; GPC-1.2 Student is able to analyze modern problems of science and production.

Competence code	Competence descriptor	Competence formation indicators (within this course)
GPC-2	Student is able to impart professional knowledge using modern pedagogical techniques.	GPC-2.1 Capable of transferring professional knowledge, GPC-2.2 Student is able to transfer professional knowledge using information technology
PC-17	Ability to develop work plans and programs for research in the field of landscape architecture, the ability to organize the collection, processing, analysis and systematization of scientific and technical information on the topic of research, the choice of methods and means of solving problems.	PC-17.1 Student is able to organize the collection, processing, analysis and systematization of scientific and technical information on the topic of research, the choice of methods and means of solving problems; PC-17.2 Student is able to develop working plans and programs for scientific research in the field of landscape architecture.

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The discipline "Principles of remote sensing and modeling" refers to the variable component of (B1) block B1 of the higher educational programme curriculum.

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

Competence code	Competence descriptor	Previous courses/modules, Courses*	Subsequent courses/modules, Courses*
GC-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.	-
GC-3	Student is able to organize and lead a team, developing a	Data analysis and statistics; International regulation in city	-

Compet ence code	Competence descriptor	Previous courses/modules, Courses*	Subsequent courses/modules, Courses*
	team strategy to achieve the goal.	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.	
GC-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.	-
GC-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-1	Student is able to analyze modern problems of science and production, solve complex (non-standard) tasks 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.	-

Compet ence code	Competence descriptor	Previous courses/modules, Courses*	Subsequent courses/modules, Courses*
GPC-2	Student is able to impart professional knowledge using modern pedagogical techniques.	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.	-
PC-17	Ability to develop work plans and programs for research in the field of landscape architecture, the ability to organize the collection, processing, analysis and systematization of scientific and technical information on the topic of research, the choice of methods and means of solving problems.	Data analysis and statistics; International regulation in city planning and environmental protection.	-

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

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

5. COURSE CONTENTS
Table 5.1. Course contents

Modules	Contents (topics, types of practical activities)	Workload, academic hours
GIS and spatial databases	1.1 GIS fundamentals: main definitions. History of GIS	33
	1.2 Vector and raster data formats	
	1.3 Introduction to spatial databases. PostgreSQL/PostGIS	
	1.4 Fields of GIS and remote sensing data application	
	1.5 Basics of geostatistics	
	1.6 Combined methods of spatial interpolation. Regression	

	kriging	
	1.7 Automatisation of GIS processes. Python spatial libraries	
Remote sensing	2.1 Introduction to remote sensing	33
	2.2 Spectral signatures and spectral indexes	
	2.3 Remote sensing data classification	
	2.4 Atmospheric correction of raw satellite data	
	2.5 Remote sensing at thermal infrared range	
	2.6 Digital Terrain Models	
	2.7 UAV data / stereophotogrammetry	
	2.8 Soil sealing	
Independent work of students.		102
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. Lillesand, T.M., Kiefer, R.W., Chipman, J.W., 2015. Remote sensing and image interpretation, 7th ed. John Wiley & Sons, Inc, Hoboken, NJ.
2. Schowengerdt, R.A., 2006. Remote Sensing: Models and Methods for Image Processing, 3d ed. Academic Press.

Additional literature:
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 «Principles of remote sensing and modeling»
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		**Yu. A. Dvornikov**
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**
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