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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**

**Principles of remote sensing and modeling**

(title of a discipline/module)

**Recommended by the MSSN for the specialty:**

**35.04.09 Landscape architecture**

**Management and design of urban green infrastructure**

(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):**

**Landscape architecture**

(name of a specialization of the educational program)

2022 г.

## 1. GOAL OF THE DISCIPLINE

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 THE RESULTS OF THE SKILLS ACQUISITION OF THE DISCIPLINE

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)*

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-1	Able to analyze modern problems of science and production, solve complex (non-standard) tasks in professional activities.	OPK-1.1 Able to solve complex (non-standard) tasks in professional activities; OPK-1.2 Able to analyze modern problems of science and production;
OPK-2	Able to impart professional knowledge using modern pedagogical techniques.	OPK-2.1 Capable of transferring professional knowledge, OPK-2.2 Able to transfer professional knowledge using information technology.
PK-17	Ability to develop work plans and programs for research in the field of landscape architecture, the ability to organize the collection, processing,	PK-17.1 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

	analysis and systematization of scientific and technical information on the topic of research, the choice of methods and means of solving problems.	means of solving problems; PC-17.2 is able to develop working plans and programs for scientific research in the field of landscape architecture.
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### 3. THE PLACE OF THE DISCIPLINE IN THE STRUCTURE OF THE OP VO

The discipline “**Principles of remote sensing and modeling**” 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 “**Principles of remote sensing and modeling**”.

*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.		International regulation in city planning and environmental protection Undergraduate practice Data analysis and statistics Landscape planning and sustainable development Scientific writing skills Introduction to scientific research
UK-3	Able to organize and lead a team, developing a team strategy to achieve the goal.		International regulation in city planning and environmental protection Undergraduate practice Data analysis and statistics Landscape planning and sustainable development Scientific writing skills Introduction to scientific research
UK-5	Is able to analyze and take into account the diversity of cultures in the process of intercultural interaction.		International regulation in city planning and environmental protection Undergraduate practice Data analysis and statistics Landscape planning and sustainable development Scientific writing skills Introduction to scientific research
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.		International regulation in city planning and environmental protection Undergraduate practice Data analysis and statistics Landscape planning and sustainable development

			Scientific writing skills Introduction to scientific research
OPK-1	Able to analyze modern problems of science and production, solve complex (non-standard) tasks in professional activities.		International regulation in city planning and environmental protection Undergraduate practice Data analysis and statistics Landscape planning and sustainable development Scientific writing skills Introduction to scientific research
OPK-2	Able to impart professional knowledge using modern pedagogical techniques.		International regulation in city planning and environmental protection Undergraduate practice Data analysis and statistics Landscape planning and sustainable development Scientific writing skills Introduction to scientific research
PK-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.		International regulation in city planning and environmental protection Undergraduate practice Data analysis and statistics Landscape planning and sustainable development Scientific writing skills Introduction to scientific research

\* - \* - to be filled in accordance with the competence matrix SUP OP VO

#### 4. COURSE SCOPE AND TYPES OF LEARNING ACTIVITIES

The credits of the “Principles of remote sensing and modeling” amount **20** 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	2
<i>Classroom work, ac.h.</i>	<b>68</b>	<b>34</b>	<b>34</b>
<i>Including:</i>			
Lectures ( <b>LC</b> )	34	17	17
Laboratory work ( <b>LW</b> )	34	17	17
Practicice / seminars classes (P/S)			
<i>Individual work of students, ac.h.</i>	420	210	210
<i>Control (exam / pass with marks), ac.h.</i>	88	44	44
<b>Total volume of the discipline</b>	ac.h.	<b>576</b>	<b>288</b>
	credits	<b>20</b>	<b>10</b>

Добавлено примечание ((ДЮА1)): Правильно? 10 за семестр я считал

Добавлено примечание ((ДА2R1)): @Демина София Альфредовна

Добавлено примечание ((ДЮА3)): Не уверен, что правильно заполнил

Добавлено примечание ((ДА4R3)): @Демина София Альфредовна

#### 5. DISCIPLINE CONTENT

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

Sections	Topics	Type of educational work*
GIS and spatial databases	1.1 GIS fundamentals: main definitions. History of GIS	LC, LW
	1.2 Vector and raster data formats	LC, LW
	1.3 Introduction to spatial databases. PostgreSQL/PostGIS	LC, LW
	1.4 Fields of GIS and remote sensing data application	LC, LW
	1.5 Basics of geostatistics	LC, LW
	1.6 Combined methods of spatial interpolation. Regression kriging	LC, LW
	1.7 Automatisation of GIS processes. Python spatial libraries	
Remote sensing	2.1 Introduction to remote sensing	LC, LW
	2.2 Spectral signatures and spectral indexes	LC, LW
	2.3 Remote sensing data classification	LC, LW
	2.4 Atmospheric correction of raw satellite data	LC, LW
	2.5 Remote sensing at thermal infrared range	LC, LW
	2.6 Digital Terrain Models	LC, LW
	2.7 UAV data / stereophotogrammetry	LC, LW
	2.8 Soil sealing	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	QGIS, R, RStudio, postgresql/postgis, ESA SNAP, python IDE.

Type of classroom	Classroom description	Specialized training/laboratory equipment, software and materials for learning the discipline (if necessary)
	a set of specialized equipments (r. 203, 418)	
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)	QGIS, R, RStudio, postgresql/postgis, ESA SNAP, python IDE.

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

## 7. METHODOLOGICAL AND INFORMATIONAL SUPPORT OF THE DISCIPLINE

### **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](http://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. 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 "**Principles of remote sensing and modeling**" 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

Signature

V.I. Vasenev

Name and family name

Lecturer of the Department of  
Landscape Design and Sustainable  
Ecosystems

Position

Signature

Y.A. Dvornikov

Name and family name

**Director of the Department:**

Director of the Department of  
Landscape Design and Sustainable  
Ecosystems

Position

Signature

E.A. Dovletyarova

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**Director of the Institute:**

Agrarian Technological Institute

Position

Signature

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Name and family name

