

Документ подписан простой электронной подписью
Информация о владельце:
ФИО: Ястребов Олег Александрович
Должность: Ректор
Дата подписания: 06.06.2022 14:36:12
Уникальный программный ключ
ca953a0120d891083f939673078ef1a989dae18a

**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

Data analysis and statistics

(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 «Data analysis and statistics» is to obtain basic theoretical knowledge and practical skills in data collecting, processing, and analysis in the sphere of landscape architecture and ecology.

2. REQUIREMENTS FOR THE RESULTS OF THE SKILLS ACQUISITION OF THE DISCIPLINE

Learning the discipline «Data analysis and statistics» 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-4	Is able to use modern communication technologies in the state language of the Russian Federation and foreign language(s) for academic and professional interaction.	UK-4.1 Able to prepare all necessary project documentation in Russian and foreign languages; UK-4.2 Able to communicate on the project in Russian and foreign languages;
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.
UK-7	Able to take a systematic approach to information culture.	UK-7.1 Able to systematically analyze the state of the project in the information field. UK-7.2 Able to work within the information field to promote the project.
OPK-1	Able to analyze modern problems of science and production, solve complex (non-standard) tasks in professional	OPK-1.1 Able to solve complex (non-standard) tasks in professional activities; OPK-1.2 Able to analyze modern problems

	activities.	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.
OPK-3	Is able to develop and implement new effective technologies in professional activity.	OPK-3.1 Able to implement new effective technologies in professional activities; OPK-3.2 Able to develop new effective technologies in professional activities.
OPK-4	Able to conduct scientific research, analyze results, and prepare reporting documents.	OPK-4.1 Capable of conducting scientific research; OPK-4.2 Able to prepare reporting documentation;
OPK-5	Is able to carry out a feasibility study of projects in professional activities.	OPK-5.1 Able to carry out economic feasibility study of projects; OPK-5.2 Able to carry out feasibility study of projects.
OPK-6	Able to manage teams and organize production processes.	OPK-6.1 Ability to organize production processes; OPK-6.2 Ability to manage the team.
OPK-7	Able to critically analyze and apply a systematic approach to the digital economy.	OPK-7.1 Ability to apply a systematic approach. OPK-7.2 Ability to perform critical analysis.
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.	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 means of solving problems; PK-17.2 is able to develop working plans and programs for scientific research in the field of landscape architecture.
PK-24	Readiness to develop (based on current standards) methodological and regulatory documents for the design of objects of landscape architecture.	PK-24.1 Able to prepare an IEI report. PK-24.2 Able to conduct environmental surveys.
UK-7.1	Is able to search for the required sources of information and data, perceive, analyze, memorize and transfer information using digital tools and algorithms when working with data obtained from various sources in order to effectively use the information obtained to solve problems.	UK-7.1.1.1 Able to apply algorithms for effective evaluation of obtained data to solve assigned tasks; UK-7.1.2 Able to use open and closed sources of information for data collection and analysis.
UK-7.2	Is able to assess information, its reliability, build logical conclusions on the basis of incoming information and data.	UK-7.2.1 Is able to check the reliability of the received information. UK-7.2.2 Is able to logically evaluate the reliability of the received information.

3. THE PLACE OF THE DISCIPLINE IN THE STRUCTURE OF THE OP VO

The discipline “**Data analysis and statistics**” 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 **"Data analysis and statistics"**.

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.	Phytopathology and Plant Protection Landscape engineering and nature-based solution Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)	International regulation in city planning and environmental protection Undergraduate practice
UK-3	Able to organize and lead a team, developing a team strategy to achieve the goal.	Phytopathology and Plant Protection Landscape engineering and nature-based solution Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)	International regulation in city planning and environmental protection Undergraduate practice
UK-4	Is able to use modern communication technologies in the state	Phytopathology and Plant Protection Landscape engineering and	International regulation in city planning and environmental protection

	language of the Russian Federation and foreign language(s) for academic and professional interaction.	nature-based solution Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)	Undergraduate practice
UK-5	Is able to analyze and take into account the diversity of cultures in the process of intercultural interaction.	Phytopathology and Plant Protection Landscape engineering and nature-based solution Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)	International regulation in city planning and environmental protection Undergraduate practice
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.	Phytopathology and Plant Protection Landscape engineering and nature-based solution Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise,	International regulation in city planning and environmental protection Undergraduate practice

		public administrations and other organizations Scientific research and thesis preparation (in English)	
UK-7	Able to take a systematic approach to information culture.	Phytopathology and Plant Protection Landscape engineering and nature-based solution Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)	International regulation in city planning and environmental protection Undergraduate practice
OPK-1	Able to analyze modern problems of science and production, solve complex (non-standard) tasks in professional activities.	Phytopathology and Plant Protection Landscape engineering and nature-based solution Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)	International regulation in city planning and environmental protection Undergraduate practice
OPK-2	Able to impart professional knowledge using modern pedagogical techniques.	Phytopathology and Plant Protection Landscape engineering and nature-based solution Green infrastructure urban climate and carbon neutrality	International regulation in city planning and environmental protection Undergraduate practice

		Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)	
OPK-3	Is able to develop and implement new effective technologies in professional activity.	Phytopathology and Plant Protection Landscape engineering and nature-based solution Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)	International regulation in city planning and environmental protection Undergraduate practice
OPK-4	Able to conduct scientific research, analyze results, and prepare reporting documents.	Phytopathology and Plant Protection Landscape engineering and nature-based solution Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in	International regulation in city planning and environmental protection Undergraduate practice

		English)	
OPK-5	Is able to carry out a feasibility study of projects in professional activities.	Phytopathology and Plant Protection Landscape engineering and nature-based solution Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)	International regulation in city planning and environmental protection Undergraduate practice
OPK-6	Able to manage teams and organize production processes.	Phytopathology and Plant Protection Landscape engineering and nature-based solution Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)	International regulation in city planning and environmental protection Undergraduate practice
OPK-7	Able to critically analyze and apply a systematic approach to the digital economy.	Phytopathology and Plant Protection Landscape engineering and nature-based solution Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring	International regulation in city planning and environmental protection Undergraduate practice

		<p>Research planning</p> <p>Scientific research</p> <p>Internship in research laboratories, enterprise, public administrations and other organizations</p> <p>Scientific research and thesis preparation (in English)</p>	
PK-17	<p>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.</p>	<p>Phytopathology and Plant Protection</p> <p>Landscape engineering and nature-based solution</p> <p>Green infrastructure urban climate and carbon neutrality</p> <p>Principles of remote sensing and modeling</p> <p>Advances in environmental monitoring</p> <p>Research planning</p> <p>Scientific research</p> <p>Internship in research laboratories, enterprise, public administrations and other organizations</p> <p>Scientific research and thesis preparation (in English)</p>	<p>International regulation in city planning and environmental protection</p> <p>Undergraduate practice</p>
PK-24	<p>Readiness to develop (based on current standards) methodological and regulatory documents for the design of objects of landscape architecture.</p>	<p>Phytopathology and Plant Protection</p> <p>Landscape engineering and nature-based solution</p> <p>Green infrastructure urban climate and carbon neutrality</p> <p>Principles of remote sensing and modeling</p> <p>Advances in environmental monitoring</p> <p>Research planning</p> <p>Scientific research</p> <p>Internship in research laboratories, enterprise, public administrations and other organizations</p> <p>Scientific research and thesis preparation (in English)</p>	<p>International regulation in city planning and environmental protection</p> <p>Undergraduate practice</p>
UK-7.1	<p>Is able to search for the required sources of information and data,</p>	<p>Phytopathology and Plant Protection</p> <p>Landscape engineering and</p>	<p>International regulation in city planning and environmental protection</p>

	perceive, analyze, memorize and transfer information using digital tools and algorithms when working with data obtained from various sources in order to effectively use the information obtained to solve problems.	nature-based solution Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)	Undergraduate practice
UK-7.2	Is able to assess information, its reliability, build logical conclusions on the basis of incoming information and data.	Phytopathology and Plant Protection Landscape engineering and nature-based solution Green infrastructure urban climate and carbon neutrality Principles of remote sensing and modeling Advances in environmental monitoring Research planning Scientific research Internship in research laboratories, enterprise, public administrations and other organizations Scientific research and thesis preparation (in English)	International regulation in city planning and environmental protection Undergraduate practice

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

4. COURSE SCOPE AND TYPES OF LEARNING ACTIVITIES

The credits of the “**Data analysis and statistics**” amount **8** 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 3
<i>Classroom work, ac.h.</i>		34	34
<i>Including:</i>			
Lectures (LC)		17	17
Laboratory work (LW)		17	17
Practicice / seminars classes (P/S)			
<i>Individual work of students, ac.h.</i>		210	210
<i>Control (exam / pass with marks), ac.h.</i>		44	44
Total volume of the discipline	ac.h.	288	288
	credits	8	8

5. DISCIPLINE CONTENT

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

Sections	Topics	Type of educational work*
Data organization, description and visualization	1.1 Introduction to the DAS in ecology and landscape studies.	LC
	1.1 Introduction to the R – program for data analysis. Types of data in R.	LW
	1.2 Types of variables and approaches to data visualization.	LC
	1.2 Approaches to visualization of numeric and character variables in R.	LW
	1.3 Descriptive statistics.	LC
	1.3 The practice of applying functions to calculate descriptive statistics: measures of central tendency and data variation.	LW
Statistical tests	2.1 Probability and statistical hypothesis. Hypothesis testing.	LC
	2.1 The practical review of the basic probability distributions in R.	LW
	2.2 Data distributions, z-score.	LC
	2.2 Normal distribution. Data transformation. Tests for checking the normal distribution. Confidence intervals: calculation and visualization in R.	LW
	2.3 One-sample and two-sample T-test.	LC
	2.3 Approaches to the comparing means of two independent and dependent samples in R.	LW
	2.4 Comparing of several samples (ANOVA)	LC
	2.4 One-way ANOVA in R.	LW
	2.5 Correlation and regression analysis.	LC
	2.5 Correlation and regression.	LW
	Final work project (theory and practice)	LC

* - 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 a set of specialized equipments (r. 203, 418)	Draper Diplomat tripod screen 213x213 83", Workstation based on a system unit assembly and a monitor to work with graphics applications. Model AG_PC Axioma Group/Processor Intel Core I3 8 Co-Memory Crucial by Micron DDR4 8CV*2;Motherboard PRIME B360-PLUS;MoHHTop Samsung 23.5, Software ArchiCad 15, AutoCAD12, SketchUp, QGIS 2.10 (Quantum GIS)
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)	Draper Diplomat tripod screen 213x213 83", Workstation based on a system unit assembly and a monitor to work with graphics applications. Model AG_PC Axioma Group/Processor Intel Core I3 8 Co-Memory Crucial by Micron DDR4 8CV*2;Motherboard PRIME B360-PLUS;MoHHTop Samsung 23.5, Software ArchiCad 15, AutoCAD12, SketchUp, QGIS 2.10 (Quantum GIS)

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

7. METHODOLOGICAL AND INFORMATIONAL SUPPORT OF THE DISCIPLINE

The main literature:

1. D. M. Diez, C.D. Barr, M. Cetinkaya-Rundel . OpenIntro Statistics. 2014. openintro.org
2. D. Borcard, F. Gillet, P. Legendre. Numerical Ecology with R. 2011.
3. Kabacoff R.I. R In Action. Data analysis and graphics with R. Second edition. 2015.
4. Logan M. Biostatistical design and analysis using R. A practical guide. 2010.
5. Quick J.M., Statistical Analysis in R: Beginners Guide. 2010. ...

Additional literature:

1. Mastitsky S.E., Shitikov V.K. Statistical analysis and visualization of data with R. 2014. E-book, access address: <http://r-analytics.blogspot.com> (in Russian)

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 «**Data analysis and statistics**»

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

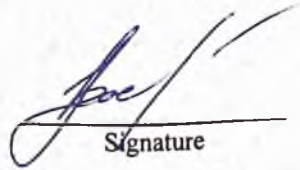
Assessment materials (AM) and score-rating system* (SRS) for assessing the level of competence (part of competences) for the "**Data analysis and statistics**" discipline are presented in the Supplementary to this Work program of the discipline.

* - 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

Senior Lecture of the Department of
Landscape Design and Sustainable
Ecosystems

Position



Signature

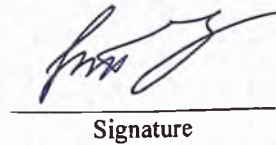
K.V. Ivashchenko

Name and family name

Director of the Department:

Director of the Department of
Landscape Design and Sustainable
Ecosystems

Position



Signature

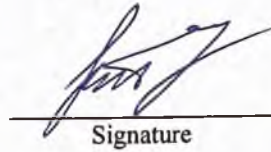
E.A. Dovletyarova

Name and family name

Director of the Institute:

Agrarian Technological Institute

Position



Signature

E.A. Dovletyarova

Name and family name