Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
NAMED AFTER PATRICE LUMUMBA (RUDN University)

Agrarian and Technological Institute

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

COURSE SYLLABUS

Introduction in scientific research

course title

Recommended by the Didactic Council for the Education Field of:

35.03.09 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 aim of discipline «Introduction in scientific research» is to provide basic theoretical knowledge and practical skills in scientific writing, data collecting, processing and presenting research results in the sphere of landscape architecture

2. REQUIREMENTS FOR LEARNING OUTCOMES

The development of the discipline «Introduction in scientific research» 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)
PC-18	Ability to prepare scientific and technical reports, reviews, publications based on the results of research in the field of landscape architecture.	PC-18.1 Ability to prepare scientific articles, reports on ongoing research; PC-18.2 Ability to develop work plans and programs for scientific research in the field of landscape architecture.

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The discipline "Introduction in scientific research" refers to the variable component of (B1) block B1 of the higher educational programme curriculum.

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 «Introduction in scientific research».

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***
PC-18	Ability to prepare scientific and technical reports, reviews, publications based on the results of research in the field of landscape architecture.	-	-

4. COURSE WORKLOAD

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

5. COURSE CONTENTS

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

Modules	Contents (topics, types of practical activities)	Workload, academic hours
1. Development of the scientific picture of the world	1.1. Stages of science development 1.2. Evolutionary and revolutionary models of science development	10
2. Methodology of scientific research	2.1 Scientific observation 2.2 Experiment 2.3 Models and modeling	15
3. Introduction into descriptive statistics	3.1 Measuring scales: ordinal, integral and ratio scales, continuous and discrete variables 3.2 Sample. Representativeness of sample 3.3 Mean, range, variance, coefficient of variance, stand deviation	15
4. Data analysis and prediction	4.1 Confident interval. P-level 4.2 T statistics and t-test 4.3 Correlation (Pearson and Spearmen correlation coefficients) 4.4 Regression (multiple, linear/ non-linear regression)	22
5. Scientific writing: thesis, publication, monograph	5.1 Conference thesis 5.2 Scientific paper 5.3 Master and PhD thesis	15
6. Visualization of research results – from tables towards GIS	6.1 Approaches to visualize scientific results 6.2 Tables: structural elements and design rules 6.3 Graphical visualization of research results	15
7. Business in science	7.1 International scientific community 7.2 Commercialization of scientific results. Sources of research funding 7.3 National and international grants and programs. Scientific foundations	15
Independent work of students.		74
Control (exam/test with assessment).		35
	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

Basic literature:

Printed publications:

1). Borovikov, V., 2003. Art of computer data analysis. Piter. Saint-Petersburg.

2). D.M. Diez, C.D. Barr and M. Centinkaya-Rundel OpenIntro Statistics Second edition. Second Edition. Current Printing: July 2014..

3). Aller L., T. Bennett, J. H. Lehr, R. J. Petty, and G. Hackett. 1987. DRASTIC: A standardized system for evaluating ground water pollution potential using hydrogeological settings. EPA/600/2-87/035. Washington, D.C.: Environmental Agency.

4). Bailey, T. C., and A. C. Gatrell. 1995. Interactive spatial data analysis. Harlow, UK: Longman.

5). C-P. Pifo. Statistica. Hockenheim. 2011.

1. ***Electronic and printed full-text materials:*** Batty, M. J. 1997. The computable city. International Planning Studies 2: 155–73.
2. Batty, M. J., and P. A. Longley. 1994. Fractal cities: A geometry of form anfunction. San Diego, Calif.: Academic Press.
3. Benenson, I. 2004. Agent-based modeling: From individual residential to urban residential dynamics. In Spatially integrated social science, ed. M. Goodchild and D. J. Janelle, 67–94. New York: Oxford University Press.
4. Berger T. Agent-based spatial models applied to agriculture: a simulation tool for technology diffusion, resource use changes and policy analysis. 2001. Agricultural Economics. # 25. P. 245–260.
5. Peuquet, D. 2002. Representations of space and time. New York: Guilford.
6. Tomlin, C. D. 1990. Geographic information systems and cartographic modeling. Englewood Cliffs, N.J.: Prentice Hall.
7. Worboys, M. F., and M. Duckham. 2004. GIS: A computing perspective. New York: Taylor and Francis.
8. Zeiler, M. 1999. Modeling our world: The ESRI guide to geodatabase design. Redlands, Calif.: ESRI Press.

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Additional literature:

Electronic and printed full-text materials:

1. Carey, G. F., ed. 1995. Finite element modeling of environmental problems: Surface and subsurface flow and transport. New York: John Wiley and Sons.
2. Crosier, S. J., M. F. Goodchild, L. L. Hill, and T. R. Smith. 2003. Developing an infrastructure for sharing environmental models. Environment and Planning B: Planning and Design 30: 487–501.
3. Dibble, C., and P. G. Feldman. 2004. The GeoGraph 3D Computational Laboratory: network and terrain landscapes for RePast. Journal of Artificial Societies and Social Simulation 7(1). Available: jasss.soc.surrey.ac.uk/ 7/1/7.html.
4. Engelen G., White R., De Nij T. Environment Explorer: Spatial Support System for the Integrated Assessment of Socio-Economic and Environmental Policies in the Netherlands. 2003. Integrated Assessment. V. 4, #. 2. P. 97–105..

5. Goodchild M.F. GIS and modeling overview. In: GIS, Spatial Analysis and Modeling. Maguire D.J. , Batty M., Goodchild M.F. (Eds). ESRI Press, Redlands. P. 2-17.
6. Goodchild, M. F., and J. Proctor. 1997. Scale in a digital geographic world. Geographical and Environmental Modeling 1: 5–23.
7. Goodchild, M. F., B. O. Parks, and L. J. Steyaert. 1993. Environmental modeling with GIS. New York: Oxford University Press.

Resources of the Internet information and telecommunication network:

Open statistic software www.r-project.org
Statistica manuals www.statsoft.ru
Open GIS software www.qgis.com
Science Direct: http://www.sciencedirect.com
EBSCO: http://search.ebscohost.com
Springer/Kluwer: http://www.springerlink.com
Tailor & Francis: http://www.informaworld.com
Data bases and survey systems
GISLAB: http://www.gis-lab.info
Google Earth Engine https://explorer.earthengine.google.com/#workspace
USGS Earth Explorer https://earthexplorer.usgs.gov/
Copernicus Global Land Service https://land.copernicus.eu/global/products/lc
Global Soil Map and Database https://soilgrids.org/

Educational and methodological materials for independent work of students during the development of the discipline/ module:*

1. Workbook on the discipline «Introduction in scientific research».
2. Methodological guidelines for students on the development of the discipline «Introduction in scientific research»

* - all teaching materials for independent work of students are placed in accordance with the current procedure on the discipline page in the **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 — **V. I. Vasenev**

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