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**Федеральное государственное автономное образовательное учреждение  
высшего образования «Российский университет дружбы народов»**

**Инженерная Академия**

(наименование основного учебного подразделения (ОУП)-разработчика программы аспирантуры)

**Департамент строительства**

(наименование базового учебного подразделения (БУП)-разработчика программы аспирантуры)

## **THE WORKING PROGRAM OF THE DISCIPLINE**

### **РАБОЧАЯ ПРОГРАММА ДИСЦИПЛИНЫ**

Methodology of Scientific Research

(наименование дисциплины/модуля)

#### **Научная специальность:**

Building designs, buildings and constructions / Строительные конструкции, зданий и  
сооружения (англ.)

Structural mechanics / Строительная механика (англ.)

(код и наименование научной специальности)

#### **Освоение дисциплины ведется в рамках реализации программы аспирантуры:**

Building designs, buildings and constructions / Строительные конструкции, зданий и  
сооружения (англ.)

Structural mechanics / Строительная механика (англ.)

(наименование программы аспирантуры)

**2022 г.**

## 1. GOALS OF THE DISCIPLINE / ЦЕЛЬ ОСВОЕНИЯ ДИСЦИПЛИНЫ

The purpose of mastering the discipline «Methodology of Scientific Research» is preparation for the candidate's examinations and obtaining knowledge, skills and experience in the field of construction.

## 2. REQUIREMENTS FOR THE RESULTS OF MASTERING THE DISCIPLINE / ТРЕБОВАНИЯ К РЕЗУЛЬТАТАМ ОСВОЕНИЯ ДИСЦИПЛИНЫ

The process of studying the discipline «Methodology of Scientific Research» is aimed at the formation of the following competencies:

- possession of the methodology of theoretical and experimental research in the field of construction;
- possession of the culture of scientific research in the field of construction, including the use of the latest information and communication technologies;
- the ability to comply with the norms of scientific ethics and copyright;
- the ability to professionally operate modern research equipment and instruments;
- possession of methods for the development of scientific and methodological foundations of research, improvement, theoretical, experimental and feasibility study of the use of various technical solutions and technologies in construction.

## 3. SCOPE OF DISCIPLINE AND TYPES OF EDUCATIONAL WORK / ОБЪЕМ ДИСЦИПЛИНЫ И ВИДЫ УЧЕБНОЙ РАБОТЫ

The total workload of the discipline «Methodology of Scientific Research» is 2 credit units.

*Table 3.1. Types of educational work by periods of mastering the postgraduate program*

Type of educational work	Total hours	Course			
		1	2	3	4
<i>Classroom lessons (total)</i>	36	36			
including:					
Lectures (LC)	24	24			
Laboratory work (LW)	-	-			
Practical lessons (PL)	12	12			
<b>Independent work (total)</b>	36	36			
<i>Control (test with assessment), total</i>	-	-			
<b>Total labor intensity</b>	hour	<b>72</b>	<b>72</b>		
	credits	<b>2</b>	<b>2</b>		

## 5. CONTENT OF THE DISCIPLINE / СОДЕРЖАНИЕ ДИСЦИПЛИНЫ

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

<b>The name of the discipline section</b>	<b>Section content (topics)</b>	<b>Type of study work</b>
<b>Theoretical research</b>	<p>Topic 1.1. Science as a continuously developing system of knowledge of the objective laws of nature, society and thinking. The purpose of science. Scientific research. Research objectives.</p> <p>Topic 1.2. Fundamentals of scientific research methodology. Theoretical research. Applied research. Technical and technological development. The purpose of the development.</p> <p>Topic 1.3. Scientific and technical information. Scientific direction. Scientific problem. Problem formulation and hypothesis. Scientific theme.</p>	LC, PL
<b>Planning experiments and observations</b>	<p>Topic 2.1. Fundamentals of experimental research methodology. Goals and objectives of experimental research. Experiment planning. Planning matrix.</p> <p>Topic 2.2. Random balance method. Random balance method. Construction of interpolation models. Process optimization (planning extreme experiments). Regression analysis. Factorial experiment.</p>	LC, PL
<b>Experimental research</b>	<p>Topic 3.1. Natural experiments. Artificial experiments. Computational experiments. Laboratory experiment. Natural experiment. Research (search) experiment. Confirmatory experiment.</p> <p>Topic 3.2. Method design and equipment selection. Preparation of samples and elements. Developing a plan for controlling variables.</p> <p>Topic 3.3. Carrying out an experiment. Processing and interpretation of results. Preparation of a scientific report.</p>	LC, PL
<b>Processing and analysis of research results</b>	<p>Topic 4.1. Comparison of the results of theoretical and experimental studies. Matching criteria. Criteria for the adequacy of theoretical relationships to experimental ones.</p> <p>Topic 4.2. Mathematical processing of experimental data. Analysis of the results of experimental studies.</p> <p>Topic 4.3. Preparation of research results for publication and scientific periodicals. Scientific and technical report. Abstract.</p>	LC, PL

## 6. MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE / МАТЕРИАЛЬНО-ТЕХНИЧЕСКОЕ ОБЕСПЕЧЕНИЕ ДИСЦИПЛИНЫ

*Table 6.1. Logistics of discipline*

Type of auditorium	Auditorium equipment	Specialized educational / laboratory equipment, software and materials for mastering the discipline (if necessary)
Lecture room	An auditorium for lecture-type classes, equipped with a set of specialized furniture; board (screen) and technical means of multimedia presentations.	
Classroom for practical training	An auditorium for conducting seminar-type classes, group and individual consultations, current control and intermediate certification, equipped with a set of specialized furniture and technical means for multimedia presentations.	A set of slides, control tests, scripts for conducting classes using interactive forms of organizing the educational process, selection of tasks for current control
Computer class	Computer class for conducting classes, group and individual consultations, current control and intermediate certification, equipped with personal computers (in the amount of 12 pcs), a board (screen) and technical means of multimedia presentations.	RUDN University software: Plaxis 2D Suit (Network license). Plaxis Professional (version 8) + Plaxis Dinamics Modul + PlaxFlow (version 1) - Education Registration number 90-07-019-00261-3 MS-office corporate, Registration code: 86626883 Parent program: 86493330 Status: Active
Educational-methodical room for independent, research work of students	An auditorium for independent work of students (can be used for seminars and consultations), equipped with a set of specialized furniture and computers with access to the EIOS.	418

\* - аудитория для самостоятельной работы обучающихся указывается обязательно!

## 7. EDUCATIONAL AND METHODOLOGICAL SUPPORT OF THE DISCIPLINE / УЧЕБНО-МЕТОДИЧЕСКОЕ И ИНФОРМАЦИОННОЕ ОБЕСПЕЧЕНИЕ ДИСЦИПЛИНЫ

*Main literature:*

1. Svintsov A.P. Methods for solving scientific and technical problems in construction: Educational and methodological complex. M. Publishing house of RUDN. 2018. - 101 p.

2. Kashirin V.P. Theory of scientific research / V.P. Kashirin. –Krasnoyarsk: Krasnoyarsk state. agrarian un-t, 2007. - 184 p.
3. Sidnyaev N.I. Theory of experiment planning and analysis of statistical data / N.I. Sidnyaev. - M. : Yurayt, 2011. - 399 p.

*Additional literature:*

1. Planning an experiment in examples and calculations. / NI Bogdanovich and others; - Arkhangelsk: Northern (Arctic) Federal University, 2010. - 126 p.
2. Rykov VV Mathematical statistics and planning of experiment-M. : MAKS Press, 2010. - 303 p.
3. Kim EN Planning and organization of the experiment. / E. N. Kim, E. P. Lapteva-Vladivostok: Dalrybvtuz, 2009. - 188 p.
4. Rozhkov NF - Planning and organization of the measuring experiment. / N.F. Rozhkov. -Omsk: Publishing house of OmSTU, 2009. - 106 p.

*Databases, reference and search systems:*

- electronic fund of legal and normative-technical documentation  
<http://docs.cntd.ru/>
- Yandex search engine <https://www.yandex.ru/>
- Google search engine <https://www.google.ru/>
- SCOPUS abstract database <http://www.elsevierscience.ru/products/scopus/>
- Site of the Ministry of Construction and Housing and Communal Services of the Russian Federation <http://www.minstroyrf.ru/>
- Electronic library system RUDN - EBS RUDN  
<http://lib.rudn.ru/MegaPro/Web>
- EBS "University Library Online" <http://www.biblioclub.ru>
- EBS Yurayt <http://www.biblio-online.ru>
- EBS "Student Consultant" [www.studentlibrary.ru](http://www.studentlibrary.ru)
- EBS "Doe" <http://e.lanbook.com/>

*Methodical instructions for students on mastering the discipline (module)\*:*

Methodological instructions for mastering the discipline are contained in the book: A.P. Svintsov. Methods for solving scientific and technical problems in construction: Educational and methodological complex. M. Publishing house of RUDN. 2018 .- 101 p.

\* - все учебно-методические материалы для самостоятельной работы обучающихся размещаются в соответствии с действующим порядком на странице дисциплины в ТУИС!

**8. FUND OF ASSESSMENT TOOLS FOR INTERMEDIATE CERTIFICATION OF STUDENTS IN THE DISCIPLINE (MODULE) / ОЦЕНОЧНЫЕ МАТЕРИАЛЫ И БАЛЛЬНО-РЕЙТИНГОВАЯ СИСТЕМА ОЦЕНИВАНИЯ УРОВНЯ СФОРМИРОВАННОСТИ КОМПЕТЕНЦИЙ ПО ДИСЦИПЛИНЕ**

Evaluation materials and a point-rating system for assessing the development of the discipline are presented in the Appendix to this Work Program of the discipline.

\* - ОМ и БРС формируются на основании требований соответствующего локального нормативного акта РУДН.

**DEVELOPERS:**

**Professor at the Department of  
Civil Engineering**



**Svintsov A.P.**

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**DIRECTOR AT THE DEPARTMENT:**

**Department of Civil engineering**



**Rynkovskaya M.I.**

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