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**Federal State Autonomous Educational Institution of Higher Education**  
**"Peoples' Friendship University of Russia"**  
**(RUDN University)**

**Academy of Engineering**

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

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

**COURSE SYLLABUS**

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«Methodology of Scientific Research / Методология научных исследований»

(наименование дисциплины/модуля)

**Scientific specialty:**

2.3.5 Mathematical Support and Software for Computer Systems, Complexes and Computer Networks / Математическое и программное обеспечение вычислительных систем, комплексов и компьютерных сетей (реализуется на английском языке)

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(код и наименование научной специальности)

**The development of the discipline is carried out as part of the implementation of the postgraduate program:**

Mathematical Support and Software for Computer Systems, Complexes and Computer Networks / Математическое и программное обеспечение вычислительных систем, комплексов и компьютерных сетей

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(наименование программы аспирантуры)

**2022 г.**

## 11. GOAL OF MASTERING THE DISCIPLINE

Aims and objectives of the discipline: organization of research activities in the chosen field; to give an idea about the scientific methodology of research, about research methods in relation to the subject area; formation of a systematic analysis of scientific information; formation of a systematic approach for the use of already developed methods of research activities in order to obtain new scientific knowledge and develop new methods of scientific research; formation of ideas about the evolution of scientific natural science; formation of a holistic systemic scientific outlook; familiarization with terms and concepts; improvement of basic professional knowledge and skills of graduate students in the field of research technology; formation of the ability to identify the main aspects of the scientific problem under study; formation of the ability to apply previously acquired knowledge in research work; the formation of practical skills in planning and organizing all stages of scientific research; ensuring a high level of independent research activities

## 2.REQUIREMENTS FOR THE RESULTS OF MASTERING THE DISCIPLINE

As a result of mastering the discipline "Methodology of Scientific Research", a graduate student must:

Know new methods for developing and researching methods for analyzing, synthesizing, optimizing and predicting the quality of the processes of functioning of aviation and rocket and space technology

Own new methods of selection and transformation of mathematical models of phenomena, processes and systems in the field of rocket and space technology for the purpose of their research and implementation by means of computer technology

Be able to use new methods for developing mathematical models, methods, computer technologies and decision support systems in scientific research, design activities, management of technological, economic, social systems and in the humanitarian fields of human activity

## 3. COURSE WORKLOAD AND ACADEMIC/TRAINING/LEARNING ACTIVITIES

The total labor intensity of the discipline "Research Methodology" is 1 credit unit.

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

Type of educational activity	Total number of hours	Year			
		1	2	3	1
<i>Contact academic hours</i>	18	18			
<i>Lectures (L)</i>					
<i>Lab work (LW)</i>	12	12			
<i>Seminars (workshops/tutorials) (S)</i>	6	6			
<i>Self-study(ies)</i>	18	18			

Type of educational activity	Total number of hours	Year			
		1	2	3	1
<i>Evaluation and assessment (exam/pass/fail grading)</i>					
<b>Total labor intensity</b>	h	<b>36</b>	<b>36</b>		
	UC	<b>1</b>	<b>1</b>		

#### 4. COURSE MODULES AND CONTENTS

Table 4.1. Content of the discipline (module) by types of educational work

Name of discipline section	Content of the section (topics)	Types of educational work *
Introduction to the theory of scientific research in informatics and computer technology. Statement of the scientific problem, goals and objectives of the study. Scientific research methods.	Theory and genesis of its development. Conceptual apparatus: theory, scientific research. Thinkers of the Ancient World and their development of basic worldview concepts and approaches to the analysis of the surrounding world. Theoretical sources as the basis for the development of thought. The genesis of the theory. Theory and science. Types of scientific research. Theoretical postulates and their representatives. Choice of the main direction of development of the theory. The priority of analysis among and unsolved problems. Possibilities of theoretical forecasting of processes and phenomena. Formation of evidence base for theoretical forecasting. Comparative analysis of theoretical approaches to science of Western and Eastern cultures. Similar, different features and uniqueness in the choice of research topic, methods of its consideration and the ultimate goal.	L

<b>Name of discipline section</b>	<b>Content of the section (topics)</b>	<b>Types of educational work *</b>
<p>The main types of scientific results in research. Approbation of research results. Rules for the design of research papers.</p>	<p>The main stages of scientific research in the physical and mathematical sciences. Observation and its features. Observation as the basis for choosing a research topic. Types of observation. Determining the relevance of the choice of topic in the physical and mathematical sciences. Search for an innovative niche. Proof of the practical significance of the chosen topic. Definition of the purpose and objectives of the study. Search for monographs, materials of scientific conferences, round tables, articles in specialized scientific publications to form a general picture in the field of proposed scientific research. Working with Internet resources and statistical sources. Techniques for collecting theoretical and empirical data. Formation of the base and verification of its reliability. Formatting quotes.</p> <p>The role of the hypothesis in scientific research in the physical and mathematical sciences. Hypothesis as a form of forecasting in scientific research in the field of physical and mathematical sciences. Evidence and experimental base to confirm the hypothesis. PEST analysis as a method of researching the scientific environment for the development of new technologies. Model types. Innovative approaches to the formation of models in the physical and mathematical sciences. Formation of graphs, diagrams, tables. Data comparability.</p>	<p><b>L,S</b></p>

Name of discipline section	Content of the section (topics)	Types of educational work *
Reviewing, opposing and other forms of evaluation of research papers. Implementation and effectiveness of scientific research. Dissertation research, its structure and defense.	Dissertation structure. Articles. Reports at regional, national and international conferences. Approbation of the results of scientific research. Participation in innovative projects in the field of physical and mathematical sciences. Requirements for writing an abstract. Delivery times. Requirements for reviews internal and external. Search for reviewers. Requirements for PowerPoint presentations. Schemes and tables in presentations. Requirements for a dissertation defense. Presentations in PowerPoint.	L

## 5.CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

*Table 5.1. Technical equipment for the discipline*

Audience type	Audience equipment	Specialized educational / laboratory equipment, software and materials for mastering the discipline (if needed)
Lecture	An auditorium for lecture-type classes, equipped with a set of specialized furniture; board (screen) and technical means of multimedia presentations.	Computer classroom equipped with 25 workstations with a personal computer, specialized software for laboratory work and practical lessons
Seminar	An auditorium for conducting seminar-type classes, group and individual consultations, current control and intermediate certification, equipped with a set	Computer classroom equipped with 25 workstations with a personal computer, specialized software for laboratory work and practical lessons

	of specialized furniture and technical means for multimedia presentations.	
Individual work	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 EIES.	

## 6. RECOMMENDED SOURCES FOR COURSE STUDIES

### *a) Basic Litr.:*

1. M. S. Mokiy, A. L. Nikiforov, and V. S. Mokiy; Ed. Mokiya M. S. METHODOLOGY OF SCIENTIFIC RESEARCH. Textbook for magistracy Scientific school: State University of Management (Moscow). S.255. 2017 Vulture UMO VO ISBN: 978-5-9916-1036-0
2. Guide to the Project Management Body of Knowledge (PMBOK), 2012
3. Polkovnikov A.V., Dubovik M.F. Project management (full MBA course). Moscow: Eksmo, 2011.
4. Project management: fundamental course: textbook / A. V. Aleshin, V. M. Anshin, K. A. Bagrationi and others; ed. V. M. Anshina, O. N. Ilyina; National research University "Higher School of Economics". - M.: Ed. House of the Higher School of Economics, 2013.— 620 p.
5. Sosnin, E.A. Management of innovative projects: Textbook / E.A. Sosnin. - Rn / D: Phoenix, 2013. - 202 p.

### *b) Addit. Litr.:*

1. National standard of the Russian Federation GOST R 54869-2011 "Project management. Project management requirements
2. Novikov D.A., Sukhanov A.L. Models and mechanisms for managing scientific projects in universities. - M.: Institute of Education Management RAO, 2005. - 80 p.
3. Polkovnikov A.V. Project management. Full MBA course / A.V. Polkovnikov, M.F. Dubovik. - M.: Olimp-Business, 2013. - 552 p.
4. Newton, R. Project management from A to Z / R. Newton. - M.: Alpina Publisher, 2016. - 180 p.

### *Resources of the information and telecommunications network "Internet":*

1. ELS of RUDN University and third-party ELS, to the materials of which graduate students of the university have access on the basis of concluded agreements:
  - RUDN Electronic Library System - RUDN EBS <http://lib.rudn.ru/MegaPro/Web>

- ELS "University Library Online" <http://www.biblioclub.ru>
- EBS - "Educational Platform Urayt" <http://www.biblio-online.ru>
- ELS "Student Consultant" [www.studentlibrary.ru](http://www.studentlibrary.ru), integrated into ELS RUDN University
- EBS "Lan" <http://e.lanbook.com/>
- EBS "Troitsky Most", integrated into the ELS of RUDN University
- EBS BOOKUP - professional medical literature <http://books-up.ru/>

## 2. Databases\*

\* information about universal and specialized information bases for selection and inclusion in the program must be taken from the website of the UNIBC (NB), link to the section <https://lib.rudn.ru/8>

- SCOPUS - scientometric, abstract database with organized access to open access publications <http://www.elsevierscience.ru/products/scopus/>

- WOS - scientometric, abstract database with organized access to open access publications [webofscience.com](http://webofscience.com)

- Google Academy (English Google Scholar) - <https://scholar.google.ru/>

- NEB, RSCI on the platform eLibrary.ru - <https://elibrary.ru/>

- RUDN University repository - <https://repository.rudn.ru/>

## 3. search engines:

- 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/>

*Educational and methodological materials for independent work of students in the development of the discipline / module.*

*All educational and methodological materials for independent work of students are placed in accordance with the current procedure on the page of the discipline in TUIS!*

## **7. EVALUATION MATERIALS AND SCORE-RATING SYSTEM FOR ASSESSING THE LEVEL OF FORMATION OF COMPETENCES IN THE DISCIPLINE**

In accordance with the requirements of the EP HE RUDN University, for attestation of students for compliance of their personal achievements with the planned discipline learning outcomes, assessment tools funds have been created (VF is presented in Annex 1).

The teacher has the right to change the number and content of assignments given to students (student), based on the contingent (their level of preparedness).

**Head of Education Programm**

Assistant of Prof., Department of  
Mechanics and Control Processes

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**Saltykova O.A.**

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**Head of Department:**

Department of Mechanics and  
Control Processes

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**Razoumny Yu.N.**

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