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ФИО: Ястребов Олег Александрович  
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**Federal State Autonomous Educational Institution of Higher Education  
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA  
NAMED AFTER PATRICE LUMUMBA  
RUDN University  
Academy of Engineering**

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

**DEPARTMENT OF MECHANICS AND CONTROL PROCESSES**

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(department realizing the PhD program)

**COURSE SYLLABUS**

**System analysis, control and information processes, statistics**

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(course title)

Scientific specialty:

**2.5.16. Dynamics, Ballistics and Control of the Spacecraft and Aircraft Motion**

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(scientific speciality code and title)

The course instruction is implemented within the PhD programmes:

**Dynamics, Ballistics and Control of the Spacecraft and Aircraft Motion**

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(PhD program title)

## **1. DISCIPLINE (MODULE) GOAL**

The purpose of mastering the discipline "Methodology of scientific research" is to prepare for surrender candidate exams, and same the acquisition of knowledge, skills and experience in the research field, characterizing the stages of the formation of competencies and ensuring the achievement of the planned results of the development of the educational program.

The main objectives of the discipline are:

- teaching the basics of scientific research methodology;
- formation of modern ideas about research related to management in organizational systems;
- formation of ideas about the basic concepts, stages, logic of scientific research;
- training in effective monitoring and diagnosis of the most pressing problems in selected specializations.
- skills building correct presentations and design scientific works of a different nature;

## **2. REQUIREMENTS TO PHD-STUDENTS ON FINISHING THE COURSE**

Mastering the discipline "Research Methodology" is aimed at preparing for the candidate's examinations, as well as mastering the following competencies:

Know:

- methods of critical analysis and evaluation of modern scientific achievements, as well as methods for generating new ideas when solving research and practical problems, including in interdisciplinary areas
- the main concepts of modern philosophy of science, the main stages of the evolution of science, functions and foundations of the scientific picture of the world
- features of presenting the results of scientific activities in oral and written form when working in Russian and international research teams
- know the main range of problems (tasks) encountered in the chosen field of scientific activity, and the main methods (methods, algorithms) for solving them;
- the main sources and methods of searching for scientific information on the issues under study.
- methodological approaches to conducting theoretical and experimental research;
- principles of organization of theoretical and experimental research.

Be able to:

- analyze alternative options for solving research and practical problems and evaluate the potential gains / losses of the implementation of these options;
- when solving research and practical problems, generate new ideas that lend themselves to operationalisms based on available resources and constraints.
- use the provisions and categories of the philosophy of science for the analysis and evaluation of various facts and phenomena
- follow the norms accepted in scientific communication when working in Russian and international research teams in order to solve scientific and educational problems;

- make personal choices in the process of working in Russian and international research teams, evaluate the consequences of the decision made and be responsible for it to yourself, colleagues and society
- find (choose) the most effective (methods) for solving the main types of problems (tasks) encountered in the chosen field of scientific activity;
- analyze, systematize and assimilate the best practices in scientific research.

Own:

- analysis of methodological problems that arise when solving research and practical problems, including those in interdisciplinary areas;
- critical analysis and evaluation of modern scientific achievements and results of activities to solve research and practical problems, including in interdisciplinary areas.
- analysis of the main ideological and methodological problems, incl. interdisciplinary character arising in science at the present stage of its development;
- ownership of planning technologies in professional activities in the field of scientific research.
- effective analysis of the main ideological and methodological problems, including . interdisciplinary nature arising from work on solving scientific and educational problems in Russian or international research teams;
- technologies for evaluating the results of collective activities to solve scientific and educational problems, including those conducted in a foreign language;
- technologies for planning activities in the framework of work in Russian and international teams to solve scientific and scientific and educational problems;
- various types of communications in the implementation of work in Russian and international teams to solve scientific and scientific and educational problems.
- modern methods, tools and technologies of research activities;
- skills in preparing and implementing a program of theoretical and experimental research.

### 3. WORKLOAD OF THE DISCIPLINE AND TYPES OF ACTIVITIES

The total workload of the discipline "Methodology scientific research" is 1 credits.

*Table 3.1. Types of academic work by period of study of the postgraduate programme*

Type of study	TOTAL, ac. h.	Course			
		1	2	3	4
Contact work, ac.h.	18	18			
including:					
Lectures (LC)	10	10			
Laboratory work (LW)					
Practical/seminar classes (SP)	8	8			
Independent work of students, ac.h.	18	18			
Control (credit with grading), ac.h.					
Total time commitment of the discipline	ac.h.	36	36		
	credits	1	1		

### 4. CONTENT OF THE DISCIPLINE

*Table 4.1. Content of the discipline (module) by type of study work*

<b>Name of discipline section</b>	<b>Section (topic) content</b>	<b>Type of study</b>
Methodological foundations of research work	The structure of scientific knowledge. Forms of organization scientific knowledge. Sources and research conditions. Concepts and functions methodology with regard to to subsoil use and mountainous sciences.	LC, SP
Fundamentals of organizing scientific research	Definition of the object, subject, hypothesis, purpose and objectives of the study in relation to subsoil use and mountainous sciences. Research methodology, research topic and its relevance. Formulation of contradictions and main problem. Research methods methodology applicable to management in organizational systems. Methods theoretical research. Statistical methods and means of formalization.	SP
Logic in scientific research work	Stages of designing the logic of research: staging, self-research and decoration - innovative	SP
Presentation of scientific work	Formulation of research results. Presentation of research work. Scientific text: characteristic. Kinds, presentation forms. Formulation of research results. Dissertation as a specific type of scientific text.	SP

## **5. EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS**

*Table 5.1. Logistical support for the discipline*

<b>Type of audience</b>	<b>Classroom equipment</b>	<b>Specialised training/laboratory equipment, software and materials for the discipline (if necessary)</b>
Lecture room	Audience for holding classes lecture type, equipped with a set of specialized furniture; board (screen) and technical means of multimedia presentation	Projector, screen, chalkboard, computer
Seminar room	Audience for holding classes lecture type, equipped with a set of specialized furniture; board (screen) and technical means of multimedia presentation	
For independent work of students	An auditorium for students' independent work (can be used for seminars and consultations), equipped with a set of specialised furniture and computers with access to the EIOS.	

\* - the classroom for students' independent work is obligatory!

## 6.METHODOLOGICAL SUPPORT AND LEARNING MATERIALS

### *Basic literature:*

1. Zimnyaya I.A., Shatenkova E.A. Research work as a specific type of human activity. - Moscow-Izhevsk, 2001 - Access mode: <https://tsitsabaza.ru/doc/66553.html> :
2. Dreshchinsky V. A. Methodology of scientific research. Textbook for undergraduate and graduate students. — M.: Yurayt . 2019. 274 s - Access mode : [https://mx3.urait.ru/uploads/pdf\\_review/28782493-AE21-4C9D-9B1C-B4D369C3C0C0.pdf](https://mx3.urait.ru/uploads/pdf_review/28782493-AE21-4C9D-9B1C-B4D369C3C0C0.pdf)
3. Dreshchinsky V. A. Fundamentals of scientific research. Textbook for open source software. — M.: Yurayt . 2019. 274 p. — Access mode : <https://static.my-shop.ru/product/pdf/338/3377381.pdf>
4. Komlatsky V. I., Loginov S. V., Komlatsky G. V. Planning and organization of scientific research. Textbook. — M.: Phoenix. 2014. 208 p. - Access mode : <https://www.studentlibrary.ru/book/ISBN9785222218402.html>

### *Further reading:*

1. Kuzin F. Thesis: Methodology writing. rules design. Order protection. Practical manual for doctoral students, graduate students and undergraduates. - 2nd ed., add. - M.: Os -89, 2001 - Access mode: <http://nashaucheba.ru/v46189/kvzin.a.thesis.techniquewriting.rules.a.decoration.order.protection>.
2. P.K. Petrov . METHODOLOGY OF PREPARATION AND DEFENSE OF THE FINAL QUALIFICATION WORK OF MASTER STUDENTS. M.: Udmurt State University, 2020 - Access mode: <https://eee-science.ru/wp-content/uploads/2021/11/D0%9F%D0%B5%D1%82%D1%80%D0%BE%D0%B2-2020-%D1%83%D1%87-%D0%BF%D0%BE%D1%81%D0%BE%D0%B1%D0%B8%D0%B5.pdf>
3. Tsypin G. M. Work on the dissertation. Navigator along the "track" of scientific research. — M.: Yurain . 2019. 36 s - Access mode : <https://avidreaders.ru/book/rabota-nad-dissertaciy-navigator-po-trasse.html>

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

1. the RUDN electronic library system and third-party electronic libraries to which university students have access on the basis of contracts:
  - RUDN Electronic Library System - RUDN EBS <http://lib.rudn.ru/MegaPro/Web>
  - The University Library Online electronic library system <http://www.biblioclub.ru>
  - The Yurite electronic library system <http://www.biblio-online.ru>
  - Student Consultant electronic library system [www.studentlibrary.ru](http://www.studentlibrary.ru)
  - Lan LGS <http://e.lanbook.com/>
  - Trinity Bridge
2. databases and search engines:
  - electronic collection of legal and normative-technical documentation <http://docs.cntd.ru/>

- search engine Yandex <https://www.yandex.ru/>
- Google search engine <https://www.google.ru/>
- SCOPUS abstract database <http://www.elsevierscience.ru/products/scopus/>

*Teaching materials for students' independent work while mastering the discipline/module\*:*

1. Course of lectures on the discipline "Methodology of Scientific Research".

\* - all teaching materials for students' independent work are placed in accordance with the current procedure on the discipline page in TUIS!

## **7. ASSESSMEN ASSESSMENT TOOLKIT AND GRADING SYSTEM FOR MIDTERM ATTESTATION OF STUDENTS IN THE DISCIPLINE (MODULE)**

Assessment toolkit and a grading system to evaluate the level of competences (competences in part) formation as the course results are specified on the TUIS platforme.

\* - OM and BRS are formed based on the requirements of the relevant local normative act of PFUR.

### **DEVELOPERS:**

**Assistant Professor of the  
Department of Innovation  
Management in Industries**

**L.O.Andreeva**

\_\_\_\_\_  
position, educational department

\_\_\_\_\_  
signature

\_\_\_\_\_  
name and surname.

### **THE HEAD OF THE DEPARTMENT:**

**Head of the Department of  
Innovation Management in  
Industries**

**O.E.Samusenko**

\_\_\_\_\_  
position, educational department

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signature

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name and surname.