Federal State Autonomous Educational Institution for Higher Education
Peoples' Friendship University of Russia named after Patrice Lumumba
(RUDN University)
Engineering Academy

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

Department "Power Engineering"

(department realizing the PhD program)

COURSE SYLLABUS

Research Methodology

(course title)

Scientific specialty:

2.4.7 Turbomachines and Piston Engines

(scientific speciality code and title)

The course instruction is implemented within the PhD programmes:

Turbomachines and Piston Engines

(PhD program title)

2026

1. DISCIPLINE (MODULE) GOAL

The purpose of mastering the discipline "Methodology of scientific research" is the preparation for the candidate's examinations, as well as 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 mastering 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 power engineering;
- formation of ideas about the basic concepts, stages, logic of scientific research;
- explanation of the theoretical foundations of the strategy for conducting scientific research in the field of production, distribution of thermal energy, control of its flows and conversion of other types of energy into heat;
- training in effective monitoring and diagnostics of the most pressing problems in the chosen specialization.
- formation of skills for the correct presentation and design of scientific papers of a different nature;

2. REQUIREMENTS TO PHD-STUDENTS ON FINISHING THE COURSE

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

Know:

- methods for critical analysis and evaluation of modern scientific achievements, as well as methods for generating new ideas in 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 can be operationalized 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, incl . 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 complexity of the discipline " Methodology of scientific research" is 1 credit unit.

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

Type of study work		**TOTAL**, acc.h.	**semester** **2**
Contact work, acc .		*18*	*18*
including:			
Lectures (**LK**)		12	12
Practical/seminar sessions (**SZ**)		6	6
Independent work of students, acc .		*18*	*18*
Control (test with assessment), acc .			
The total complexity of the discipline	ac.h.	**36**	**36**
	credit.ed.	**1**	**1**

4. CONTENT OF THE DISCIPLINE

Table 4.1. The content of the discipline (module) by type of educational work

Name of the discipline section	Contents of the section (topic)	Type of study work
Methodological foundations of research work	The structure of scientific knowledge. Forms of organization of scientific knowledge. Sources and conditions of research search. Concepts and functions of the methodology in relation to power engineering	LK, SZ
Fundamentals of organizing scientific research	Definition of the object, subject, hypothesis, purpose and objectives of the study in relation to turbomachines and piston engines. Research methodology, research topic and its relevance. Formulation of contradictions and the main problem. Research methods and techniques applicable to geosciences. Methods of theoretical research. Statistical methods and means of formalization	LK, SZ
Logic in research work	Stages of designing the logic of research: staging, actual research and design and implementation	LK, SZ
Presentation of scientific work	Formulation of research results. Presentation of research work. Scientific text: characteristic. Types, forms of presentation. Formulation of research results. Presentation of research work. Scientific text: characteristic. Types, forms of presentation. Thesis as a specific type of scientific text	LK, SZ

5. EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Table 5.1. Logistics of discipline

Audience type	**Audience equipment**	**Specialized educational / laboratory equipment, software and materials for mastering the discipline** (if necessary)
Lecture	An auditorium for lecture-type classes, equipped with a set of specialized furniture; board (screen) and technical means of multimedia presentations.	projector, screen, computer, chalkboard
Seminar	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.	projector, screen, computer, chalkboard

Audience type	Audience equipment	**Specialized educational / laboratory equipment, software and materials for mastering the discipline** (if necessary)
For independent 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.	projector, screen, computer, chalkboard

* - the audience for independent work of students is required!

6. METHODOLOGICAL SUPPORT AND LEARNING MATERIALS

Main readings:

1) Афанасьев, В.В., Грибкова, О.В., Уколова Л.И. Методология и методы научного исследования. – М.: Юрайт. 2023. – 164 с.
2) Дрещинский В. А. Методология научных исследований. – М.: Юрайт. 2023. – 350 с.
3) Лебедев С.А. Методология научного познания: уч. пособие для вузов. – М.: Юрайт, 2024. – 153 с.
4) Байбородова Л.В., Чернявская А.П. Методология и методы научного исследования. – М.: Юрайт. 2024. – 222 с.
5) Горелов Н.А., Кораблева О.Н., Круглов Д.В. Методология научных исследований. – М.: Юрайт. 2023. – 391 с.
6) Горелов Н.А., Кораблева О.Н., Круглов Д.В. Методология научных исследований: учебник и практикум для вузов / 3-е изд., перераб. и доп. М.: Юрайт, 2024. – 390 с. ISBN 978-5-534-16519-7. Текст электронный. Образовательная платформа Юрайт [сайт]. URL: https://urait.ru/bcode/536410.
7) Боуш Г.Д., Разумов В.И. Методология научного исследования (в кандидатских и докторских диссертациях): Учебник. – М.: ИНФРА-М, 2020. – 227 с. [Электронный ресурс]. URL: https://new.znanium.com/catalog/document?id=350432.

Additional readings:

1) Горовая В.И. Научно-исследовательская работа – М.: Юрайт. 2023. – 104 с.
2) Афанасьев В.В., Грибкова О.В., Уколова Л.И. Основы учебно-исследовательской деятельности. – М.: Юрайт. 2023. – 164 с.
3) Комлацкий В.И., Логинов С.В., Комлацкий Г.В. Планирование и организация научных исследований: Учебник. – М.: Феникс. 2014. – 208 с. [Электронный ресурс]. URL: https://www.studentlibrary.ru/book/ISBN9785222218402.html.
4) Найдыш В.М. Концепции современного естествознания: учебник. – М.: КноРус, 2020. – 360 с.

5) Брылев А.А., Турчаева И.Н. Основы научно-исследовательской работы. – М.: Юрайт. 2023. 205 с.
6) Синченко Г.Ч. Логика диссертации: Учебное пособие. – М.: НИЦ ИНФРА-М, 2021. – 312 с. [Электронный ресурс]. URL: https://znanium.com/catalog/document?id=367478.
7) Резник С.Д., Макарова С.Н., Резник С.Д. Эффективное научное руководство аспирантами: Монография – М.: НИЦ ИНФРА-М, 2020. – 152 с. [Электронный ресурс]. URL:https://znanium.com/catalog/document?id=355408.
8) Рой О.М. Методология научных исследований в экономике и управлении. – М.: Юрайт. 2023. – 212 с.
9) Скворцова Л.Н. Основы научных исследований: Учебное пособие для вузов. – М.: Лань. 2023. – 100 с.
10) Сладкова О.Б. Основы научно-исследовательской работы. – М.: Юрайт. 2023. – 155 с.

Resources of the information and telecommunications network "Internet":

1. RUDN ELS and third-party ELS, to which university students 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 Yurayt http://www.biblio-online.ru
- ELS " Student Consultant" www.studentlibrary.ru
- EBS "Lan" http://e.lanbook.com/
- EBS "Trinity Bridge"

2. Databases and 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/
- abstract database SCOPUS http:// www .elsevierscience.ru/ products / scopus /

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

1. A course of lectures on the discipline "Methodology of scientific research".
2. Guidelines for self-study

* - 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. 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 platform.

DEVELOPERS:

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