Federal State Autonomous Educational Institution of Higher Education «Peoples' Friendship University of Russia»

Engineering Academy

Recommended by the MSSN

WORKING PROGRAM OF THE DISCIPLINE

Name of the discipline Methodology of scientific research

It is recommended for the direction of training/specialty
09.06.01 "Computer Science and Computer Engineering" (postgraduate course)

(the code and the name of the training direction/specialty are indicated)

Orientation of the program (profile)
Mathematical modeling, numerical methods and software packages

(name of the educational program in accordance with the orientation (profile)

1. **Goals and objectives of the discipline:** organization of research activities in the chosen field; to give an idea of the scientific methodology of research, research methods in relation to the subject area; formation of a systematic analysis of scientific information; formation of a systematic approach for using 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 systematic scientific worldview; familiarization with terms and concepts; improvement of basic professional knowledge and skills of graduate students in the field of research activity 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; formation of practical skills in planning and organizing all stages of scientific research; ensuring a high level of independent research activity

2. The place of the discipline in the structure of the OP VO:

The discipline Methodology of scientific research belongs to the variable part of block 1 of the curriculum.

3. Requirements for the results of mastering the discipline:

The process of studying the discipline is aimed at the formation of the following competencies:

- the ability to design and carry out complex research, including interdisciplinary, based on a holistic systematic scientific worldview using knowledge in the field of history and philosophy of science (UK-2);
- willingness to participate in the work of Russian and international research teams to solve scientific and scientific-educational problems (UK-3);
- readiness to use modern methods and technologies of scientific communication in the state and foreign languages, including readiness for communication in oral and written forms in Russian and foreign languages to solve the tasks of professional activity, possession of foreign language communicative competence in official business, educational and professional, scientific, socio-cultural, everyday and everyday spheres of foreign language communication (UK-4);
- the ability to follow ethical standards in professional activity (UK-5);
- the ability to plan and solve problems of their own professional and personal development (UK-6).
- possession of the methodology of theoretical and experimental research in the field of professional activity (OPK-1);
- possession of the culture of scientific research, including the use of modern information and communication technologies (OPK-2);
- the ability to develop new research methods and their application in independent research activities in the field of professional activity (OPK-3);
- willingness to organize the work of the research team in the field of professional activity (OPK-4);
- the ability to objectively evaluate the results of research and development carried out by other specialists and in other scientific institutions (OPK-6);
- possession of methods of conducting patent research, licensing and copyright protection when creating innovative products in the field of professional activity (OPK-7)
- knowledge of the methodology of theoretical and experimental research in the field of computer science and computer technology, knowledge of the culture of scientific research in the field of computer science and computer technology, including using the latest information and communication technologies (PK-1);
- the ability to independent (including managerial) research activities that require extensive fundamental training in modern areas of branch science, deep specialized training in the chosen direction, possession of skills of modern research methods (PK-3);

As a result of studying the discipline, the student must:

To know: the classification of scientific research; the classification of scientific theories; methodological principles of the construction of scientific concepts; the content of the main stages of scientific research, its logic and structure; the requirements for the proposed scientific hypotheses; methods of scientific research, verification, confirmation and refutation of scientific hypotheses; modern methods of scientific research and the possibilities of their application in the field chosen by the graduate student;

Be able to: adapt modern achievements of science to their own scientific activities and self-education; perceive and critically analyze information based on a systematic scientific worldview; identify and formulate current scientific problems; determine promising areas of scientific research in the field of professional activity; substantiate the relevance of their own research; navigate the problem statement, determine methods and means of solving it, develop a research program; choose and justify the methods of scientific research and processing of the obtained data, the willingness to systematically defend their point of view; practically apply the previously acquired knowledge and skills of organizing research works; publicly speak and scientific discussion; independently master new research methods; form the content of the text of the dissertation research;

Possess: skills of generalization, analysis, systematization and critical evaluation of scientific information, including research results; skills of forming the subject and program of scientific research; skills of organizing and conducting independent scientific research; modern methods of scientific research in the subject area; skills of preparing, formatting and presenting a report on the conducted research; skills of conducting scientific discussions;

4. The volume of the discipline and types of academic work

The total labor intensity of the discipline is _____ credit units.

Type of educational work	Total hours	Semesters
		2
Classroom classes (total)	40	40
Including:	-	
Lectures	20	20
Practical exercises (PE)	20	20
Seminars (S)		
Laboratory work (LW)		
Independent work (in total)	68	68
Total labor intensity hours	108	108
credit units	3	3

5. Content of the discipline

5.1. The content of the discipline sections

№ p/p	Name of the discipline section	Content of the section (topics)
1.	Introduction to the theory of scientific research in computer science and computer engineering. Formulation of a scientific problem, goals and objectives of the study. Methods of scientific research.	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. The choice of the main direction of the theory development. Priority of the analysis of the environment and the unresolved problem. The possibilities of theoretical forecasting of processes and phenomena. Formation of the evidence base for theoretical forecasting. Comparative analysis of theoretical approaches to

		the science of Western and Eastern cultures. There are similar, different features and uniqueness in the choice of the research topic, methods of its consideration and the final goal.
2.	The main types of scientific results in research. Approbation of research results. Rules for registration of scientific research works.	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. Determination of the relevance of the topic selection in the physical and mathematical sciences. Search for an innovative niche. Proof of the practical significance of the chosen topic. Determination 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 prospective scientific research. Working with Internet resources and statistical sources. Methods of collecting theoretical and empirical data. Formation of the database and verification of its reliability. Making quotes. 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. The evidence and experimental basis for confirming the hypothesis. PEST analysis as a method of research of the scientific environment for the development of new technologies. Types of models. Innovative approaches to the formation of models in the physical and mathematical sciences. Formation of graphs, diagrams, tables. Data comparability.
3.	Reviewing, opposition and other forms of evaluation of research papers. Introduction and effectiveness of scientific research. Dissertation research, its structure and defense.	The structure of the dissertation. Articles. Presentations 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. Mailing dates. Requirements for internal and external reviews. Search for reviewers. Requirements for PowerPoint presentations. Diagrams and tables in presentations. Requirements for speaking at the dissertation defense. Presentations in PowerPoint.

(The content is indicated in didactic units. At the discretion of the developers, the material may not be presented in the form of a table)

5.2. Sections of disciplines and types of classes

№ p/p	Name of the discipline section	Lecti ons.	Pract. exerc.	Lab. work	Semin.	SRS	In total hrs.
1.	Introduction to the theory of scientific research in computer science and computer engineering. Formulation of a scientific problem, goals and objectives of the study. Methods of scientific research.	7	7			23	37
2.	The main types of scientific results in research. Approbation of research results. Rules for registration of scientific research works.	7	7			23	37

3	Reviewing, opposition and other forms of evaluation of research papers. Introduction and effectiveness of scientific research. Dissertation research, its structure and defense.	6	6			22	34

6. Laboratory practice-not provided

7. Practical classes (seminars) (if available)

№ p/p	№ of the discipline section	Topics of practical classes (seminars)	Labor intensity (hrs.)
1.	1.	Introduction to the theory of scientific research in computer science and computer engineering. Formulation of a scientific problem, goals and objectives of the study. Methods of scientific research.	7
2.	1.	The main types of scientific results in research. Approbation of research results. Rules for registration of scientific research works.	7
3	2	Reviewing, opposition and other forms of evaluation of research papers. Introduction and effectiveness of scientific research. Dissertation research, its structure and defense.	6

8. Material and technical support of the discipline:
(the material and technical base necessary for the implementation of the educational process in the discipline (module) is described).

Moscow, Ordzhonikidze str., 3, building 1, 5. Multimedia auditorium and equipment of the laboratory «Information Communication Management». The laboratory consists of three divisions - educational (room 110), educational and scientific (room 116) and scientific (room 123), and is equipped with modern network equipment and computer equipment (a set of Sharp PNL702B liquid crystal display, a 24" Acer V243HAOBD monitor, a system unit (Intel Core i7-2600 OEM processor <3.40 GHz, 8Mb, 95W, LGA1155(Sandy Bridge)>, 16GB OP, HDD 2 TB), a DMS800 projector with an interactive whiteboard Board 1077, HP XW7800, Intel Core2 2.4 GHz (8 pcs.)). The laboratory base allows you to carry out projects on the development of applied means of the infocommunication environment, conduct lectures and laboratory classes with multimedia teaching tools. Display classes DK3, DK4, DK6, DK7, Intel Core i3-550 3.2 GHz-60 pcs.

9. Information support of the discipline
(the list of information technologies used in the implementation of the educational process in the discipline (module) is indicated, including a list of software and information reference systems (if necessary))
a) software Standard personal computer software
b) ProjectLibre software
c) database, directory and search engine Yandex, Google

10. Educational and methodological support of the discipline:
(the availability of printed and electronic educational and information resources is indicated)
a) main literature

1. Moki M. S., Nikiforov A. L., Moki V. S.; Ed. Mokia M. S. METHODOLOGY OF SCIENTIFIC RESEARCH. Textbook for Master's degree Scientific school: State University of Management (Moscow). p. 255. 2017 Vulture of the UMO IN ISBN:978-5-9916-1036-0
2. Guide to the Project Management Knowledge Base (PMBOK), 2012

3. Polkovnikov A.V., Dubovik M. F. Project management (full MBA course). Moscow: Eksmo, 2011.
4. Project management: a fundamental course: textbook / A.V. Aleshin, V. M. Anshin, K. A. Bagrationi, etc.; edited by V. M. Anshin, O. N. Ilyina; Nats. research. uni-t "Higher School of Economics". - Moscow: Publishing house of the Higher School of Economics, 2013— - 620 p.
5. Sosnin, E. A. Management of innovative projects: A textbook / E. A. Sosnin. - Ph/D: Phoenix, 2013. - 202 p.

b) additional literature_____

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 of management of scientific projects in universities. - M.: Institute of Education Management of RAO, 2005. - 80 p.
3. Polkovnikov, A.V. Project management. Full course of MBA / A.V. Polkovnikov, M. F. Dubovik. - M.: Olymp-Business, 2013. - 552 p.
4. Newton, R. Project management from A to Z / R. Newton. - Moscow: Alpina Publisher, 2016. - 180 p.

11. Methodological guidelines for students on the development of the discipline (module)

During practical classes in the discipline, control measures are carried out in order to identify the acquired knowledge, skills, skills and competencies. As part of their independent work, graduate students study the educational and methodological support of the discipline, prepare homework, work on questions and tasks for self-preparation, search and review scientific publications and electronic sources of information. Independent work should be systematic and controlled by the teacher, taken into account by the teacher for issuing certification.

To improve the quality level of mastering the discipline, a graduate student should prepare for a lecture, since it is the leading form of organizing student learning and implements functions that contribute to:

- formation of the basic concepts of the discipline,
- stimulating interest in the discipline, the topics of its study,
- systematization and structuring of the entire body of knowledge in the discipline,
- orientations in the scientific literature that reveals the problems of the discipline.

Preparation for the lecture is as follows:

- study of the material of the previous lecture,
- анализ analysis of the topic of the upcoming lecture (according to the thematic plan, according to the information of the lecturer),
- familiarization with the educational material on the textbook and teaching aids,
- analysis of the place of the studied topic in your professional training,
- preparation of questions that can be asked to the lecturer at the lecture.

Preparation for practical classes:

- introduction to the practical lesson plan: first with the main questions, then with questions for discussion, assessment of the scope of the task;
- study of the lecture summary on the topic of the practical lesson, selection of the material necessary for studying the questions posed;
- familiarization with the recommended main and additional literature on the topic, new publications in periodicals;
- identification of the main concepts of the topic under study, the possession of which contributes to the effective development of the discipline;
- preparation of abstracts or mini-notes that can be used for public speaking in the classroom.

The working program of the discipline in terms of goals, a list of knowledge, skills, terms and educational questions can be used by you as a guide in the organization of training.

Preparation for the test. It is necessary to prepare for the test purposefully, regularly, systematically and from the first days of training in this discipline. At the very beginning of studying the discipline, the graduate student gets acquainted with the program for the discipline, the list of knowledge and skills that the graduate student should possess, control measures, a textbook, textbooks on the discipline being studied, electronic resources, a list of questions for the test.

Systematic performance of educational work at lectures, practical classes and classes will allow you to successfully master the discipline and create a good basis for passing the test.

Graduate students are required to attend classes, perform tasks of the head of the discipline, get acquainted with the recommended literature and prepare an essay for a round table (the choice of the topic of the essay is carried out in agreement with the head of the discipline and the scientific supervisor). Graduate students carry out projects, creative tasks for independent work, taking into account the profile of the disciplines that they will implement in the course of industrial practice. The results of completing tasks for independent work are evaluated on the basis of a point-rating assessment and are reflected in the educational route of the graduate student. When certifying a graduate student, the quality of work in the classroom is evaluated (the ability to conduct a scientific discussion, the ability to clearly and succinctly formulate their thoughts), the level of preparation for independent research activities of a specialist in the field of higher school pedagogy, the history of pedagogy and education, the quality of tasks (presentations, reports, analytical notes, etc.).

12. Fund of evaluation funds for conducting intermediate certification of students in the discipline (module)

PRS points	Traditional score in the Rus. Fed.	Points for translating grades	Score	ECTS score
95-100	5	95-100	5 +	A
86-94		86-94	5	B
69-85	4	69-85	4	C
61-68	3	61-68	3+	D
51-60		51-60	3	E
31-50	2	31-50	2+	FX
0-30		0-30	2	F
	Passed		Passed	Passed

Explanation of the rating table:

Description of ECTS ratings

A	***"Excellent"*** - the theoretical content of the course has been fully mastered, without gaps, the necessary practical skills of working with the mastered material have been formed, all the training tasks provided for in the training program have been completed, the quality of their performance is estimated by the number of points close to the maximum**.**
B	***"Very well"*** - the theoretical content of the course is fully mastered, without gaps, the necessary practical skills of working with the mastered material are mainly formed, all the training tasks provided for in the training program are completed, the quality of most of them is estimated by the number of points close to the maximum.
C	***"Well"*** - the theoretical content of the course is fully mastered, without gaps, some practical skills of working with the mastered material are not sufficiently formed, all the training tasks provided for in the training program are completed, the quality of performance of none of them is estimated by the minimum number of points, some types of tasks are completed with errors.

D	***"Acceptable"*** - the theoretical content of the course has been partially mastered, but the gaps are not significant, the necessary practical skills for working with the mastered material have been mainly formed, most of the training tasks provided for in the training program have been completed, some of the completed tasks may contain errors.
E	***"Mediocre"*** - the theoretical content of the course has been partially mastered, some practical work skills have not been formed, many of the training tasks provided for in the training program have not been completed, or the quality of some of them is estimated by the number of points close to the minimum.

Materials for assessing the level of mastering the educational material of the discipline " Methodology of scientific research " (evaluation materials), which include a list of competencies indicating the stages of their formation, a description of indicators and criteria for evaluating competencies at various stages of their formation, a description of assessment scales, standard control tasks or other materials necessary for evaluating knowledge, skills, skills and (or) experience of activity that characterize the stages of competence formation in the process of mastering an educational program, methodological materials that determine the procedures for evaluating knowledge, skills, skills and (or) experience of activity that characterize the stages of competence formation are fully developed and are available to students on the discipline page in the TUIS RUDN. The program is compiled in accordance with the requirements of OS VO RUDN

Developers:

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