Federal state autonomous educational institution of higher education
Peoples' Friendship University of Russia

Faculty of physical, mathematical and natural sciences

RESEARCH PROGRAM

Recommended for educational program
01.06.01 « Mathematics and mechanics»

Graduate's qualification: the Researcher. Teacher-researcher

1. The purposes and objectives of scientific research

The purpose of research is to acquire practical skills of independent research work, collecting material for writing a thesis and checking the validity of the conclusions made in the final qualifying work.

Research objectives

- mastering the methodology and methodology of research work by a graduate student,
- acquisition of skills in the use of modern methods of research of physical processes,
- acquisition of skills and abilities to receive, process, store and disseminate scientific information,
- mastering the methods of collecting and analyzing scientific information.

2. The place of discipline in the structure of the Basic educational program:

Research work in the system of training of highly qualified personnel is a component of professional training for research activities and is a type of practical activity of graduate students in the implementation of scientific work in higher education, including research within the theme of their final qualifying work (PhD thesis), testing of the results obtained, public presentation of a scientific report and writing a scientific article (articles) – the basis of a PhD thesis.

Research work for students in the basic educational programs (profiles) of graduate school in the direction of "Mathematics and mechanics" is an integral part of the educational program, is carried out in accordance with the curricula and serves as a logical stage of research work.

For successful research work, a graduate student must have preliminary training in mathematical and physical professional courses, possess the initial skills of scientific research, be able to work independently with the main information sources, select literature on the topic of research and prepare abstract reviews, possess the skills of using information technologies and databases.

3. Requirements to the results of mastering the discipline:

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

Content of competence	Code competences
the ability to critical analysis and evaluation of modern scientific achievements, generating new ideas in solving research and practical problems, including inter-	UC-1

disciplinary fields	
the ability to design and carry out complex research, including interdisciplinary, on the basis of a holistic system of scientific worldview using knowledge in the field of history and philosophy of science	UC-2
willingness to participate in the work of Russian and international research teams to solve scientific and educational problems	UC-3
ability to plan and solve problems of own professional and personal development	UC-5
ability to independently carry out research activities in the relevant professional field using modern research methods and information and communication technologies	GPC-1

As a result, the student develops professional competencies and upon completion of research, the graduate student must demonstrate the following results:

Know:

– about the current state of science, the main directions of scientific research, priorities.

– methods of search of literary sources on the developed subject for the purpose of their use at performance of the dissertation;

– research methods;

– methods of information analysis and processing;

– information technologies in scientific research, software products related to the professional sphere.

Be able to:

– formulate goals and objectives of scientific research;

– to choose and justify research methods;

– to draw up the results of scientific research (report, scientific article, abstracts).

Possess skills:

– work with applied scientific packages and editorial programs used in scientific research;

– analysis, systematization and generalization of information on the research topic;

– analysis of the reliability of the results;

– presentations and presentations at conferences and scientific seminars.

4. Scope of discipline and types of educational work

The total labor intensity of scientific research is 120 credits (4320 hours)

Type of educational work	Total hours	Semesters							
		1	2	3	4	5	6	7	8
Classroom lessons (total)	48	6	6	6	6	6	6	6	6
Preparatory stage		3	3	3	3	3	3	3	3
Final stage		3	3	3	3	3	3	3	3
Independent work (total)	4272	534	534	534	534	534	534	534	534
Preparatory stage		70	70	70	70	70	70	70	70
Main stage		364	364	364	364	364	364	364	364
Final stage		100	100	100	100	100	100	100	100
Type of intermediate certification (test, exam)		test	test	test	test	test	test	test	test
Total labor intensity hours	4320	540	540	540	540	540	540	540	540
credits	120	15	15	15	15	15	15	15	15

5. The content of the discipline

Activities of postgraduates in research work

Stage 1 (preparatory):

jectiveAn introductory lesture is held, where graduate students are introduced to the goals, ob-

2. Graduate students receive advice on documentation.

3. An individual work plan is drawn up with the supervisor.

Stage 2 (main):

1. The study of literature on the topic of scientific problems.
2. Statement of the problem and choice of research method.

3. Publication of scientific articles of the graduate student on the topic of scientific research in journals included in the list SCOPUS, Web of Science, conference abstracts in the number approved by the University.
4. Preparation and discussion of PhD thesis chapters.
5. Preparation of the candidate's dissertation and its pre-defense within the block "State final certification".

Stage 3 (final):

1.Summing up the results of research work.

2.Synthesis of research results in reports, articles and reports.

The supervisor analyzes the activities of graduate students, note their difficulties and the most successful solutions to the tasks in the course of the studies. The overall assessment for research work consists of the degree of participation of the graduate student in the scientific life of the Department and the University, the level of research on the thesis and documentation.

6. Material and technical support of discipline:

Classrooms 495a, 398, 509 in the PFUR, Ordzhonikidze str., 3, group classrooms in the PFUR, Ordzhonikidze str., 3 on 3, 4 and 5 floors, master classes, laboratories (cl. 510 and 424).

7. Information support of discipline:

Only licensed software installed in the PFUR is used:

- software package Microsoft Office;
- multimedia equipment and personal computers;
- full-text databases and resources which can be accessed from the network PFUR;

8. Training and methodological support independent work of graduate students during the period of research training

Independent work of the graduate student is carried out in accordance with the individual plan developed by the graduate student and the supervisor, approved in accordance with the schedule of the educational process by the relevant Department.

Graduate students in their work use sources on the topic of their scientific research. The graduate student is required to read the papers on the subject of his research, recommended by supervisor, scientists working in Universities and in other scientific and educational organizations, representing the main mathematical schools of the country. It is mandatory for a graduate student to familiarize himself with the works on the topic of his research published in interna-

tional publications available through international (including and electronic) library systems, which are provided by PFUR.

The graduate student conducts research independently, avoiding plagiarism, as well as minimizing verbatim borrowing of previously published works.

It is supposed to get acquainted with the work of dissertation councils: the study of normative materials regulating their activities; understanding the duties of the Chairman of the dissertation Council, his Deputy and scientific Secretary of the dissertation Council; familiarization with the rules of registration, submission to the defense and defense of dissertations

9. Educational-methodical and information support of practice

Independent work of the graduate student is carried out in accordance with the individual plan developed jointly with the supervisor.

The graduate student in his work uses sources on the topic of his scientific research. At the same time, the graduate student is obliged to familiarize himself with the works on the topic of his research recommended to him by the supervisor.

Databases, reference and search engines

1. http://vak.ed.gov.ru
2. Electronic library http://www.rsl.ru/
3. The website of the library PFUR http://lib.rudn.ru/
4. Science Direct http://www.sciencedirect.com
5. EBSCO http://search.ebscohost.com, Academic Search Premier
6. Oxford University Press http://www3.oup.co.uk/jnls. Journals in exact and technical Sciences.
7. Sage Publications http://online.sagepub.com .
8. Springer/Kluwer http://www.springerlink.com. Magazines and books publishing
9. Tailor & Francis http://www.informaworld.com . The collection of journals has more than 1000 titles in all fields of knowledge.
10. American Mathematical Society http://www.ams.org/ Resource of the American mathematical society.
11. European Mathematical Society http://www.euro-math-soc.eu/ Resource of the European mathematical society.
12. Portal to Mathematics Publications http://www.emis.de/projects/EULER/
13. Catalog of mathematical Internet resources http://www.mathtree.ru/
14. Zentralblatt MATH (zbMATH) https://zbmath.org
15. All-Russian mathematical portal mathnet.ru

16. Web of Science http://www.isiknowledge. com

Periodicals

Review of Modern Physics, Review of Modern Physics, Annual Review of Astronomy and Astrophysics, Annual Review of Biochemistry, Chemical Reviews Nature Physics, Annual Review of Condensed Matter Physics, Annals of Mathematics, Journal of the American Mathematical Society, Acta Mathematica, Communications on Pure and Applied Mathematics Swarm and Evolutionary Computation Geometric and Functional Analysis Formal Aspects of Computing, Discrete Mathematics, Theory of Computing Systems Reports on Progress in Physics New Journal of Physics.

10. Forms of interim certification (based on the results)

As a result, the graduate student submits a detailed written report. The report includes General information (surname, name, patronymic; theme of the final qualifying work (PhD thesis), as well as information characterizing the content of the work of the graduate student and reflecting the implementation of the program of research work).

The report should include information:

- about performance of the individual task;
- preparation for publication of articles in journals included in the list of SCOPUS, Web of Science;
- about participation of the graduate student in conferences with reports on a subject of the research;
- participation in the research work of the Institute;
- on the degree of readiness of the final qualifying work (PhD thesis).

The report may be accompanied by documents that contain information about the results of the student's work during the period of research (for example, the texts of articles or reports prepared by the graduate student on the materials collected during the internship).

The results are determined by conducting an interim assessment with the scores "excellent", "good", "satisfactory", "unsatisfactory" and in the system of ECTS (A, B, C, E). The basis for their exposure is adopted in PFUR point-rating system.

11. Fund of assessment tools for carrying out the interim assessment of scientific research

FAT on discipline is presented in the Appendix to this program.

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