

*Federal State Autonomous Educational Institution of
Higher Education
"Peoples' Friendship University of Russia"
Academy of Engineering*

WORKING PROGRAM OF THE PRACTICE

Type of practice: Manufacturing practice

Type (name) of the practice: Practical training for obtaining professional skills and
experience of professional activity (research)

Direction of preparation: 01.06.01 Mathematics and Mechanics

Scientific specialty: Dynamics, Ballistics, Control of Motion of Aircraft and Spacecraft
(Technical Sciences)

Москва,
2021

1. The purpose and objectives of the practice

The practice of obtaining professional skills and experience of professional activity (research) is a production practice and is aimed at acquiring practical skills of independent conducting research work, consolidating theoretical knowledge obtained during classroom, practical, laboratory and educational research classes, as well as introducing a graduate student to the social environment in order to acquire social and personal competencies necessary for working in the professional sphere.

Main objectives The practice of obtaining professional skills and experience of professional activity (research) are:

- to study the experience of scientific and analytical activities;
- learn the skills of presenting the results obtained in the form of reports, publications, reports;
- master modern methods and methodology of scientific research.

2. The place of practice in the structure of OPOP VO

The practice of obtaining professional skills and experience of professional activity (research) belongs to the variable part of Block 2 of the curriculum. Its completion is based on the material of previous disciplines and/or practices, and it is also the basis for the study of subsequent disciplines and/or practices of the curriculum, the list of which is presented in table 1.

Table 1 - List of previous and subsequent disciplines/practices

№ i/o	Cipher and name of competence	Previous disciplines/practices	Subsequent disciplines
Universal competencies			
1	the readiness to use modern methods and technologies of scientific communication in the state and foreign languages, including the readiness for communication in oral and written forms in Russian and foreign languages to solve the problems of professional activity, possession of foreign language communicative competence in official business, educational and professional, scientific, socio-cultural, everyday-everyday spheres of		Foreign Language in the Sphere of Professional Communication / Иностраннй язык в сфере профессиональной коммуникации Russian Language in the Sphere of Professional Communication / Русский язык в сфере профессиональной коммуникации

	foreign language communication (UC-4)		
General professional competencies			
2	the ability to independently carry out research activities in the relevant professional field using modern research methods and information and communication technologies (GPC-1)		Priority Directions of Development of Mathematics and Mechanics / Приоритетные направления развития математики и механики Scientific Research / Научные исследования (научноисследовательская деятельность) Scientific Research / Научные исследования (подготовка научно-квалификационной работы (диссертации) на соискание ученой степени кандидата наук)
Professional competencies (type of professional activity _____)			
3	the readiness to apply promising research methods and solve professional problems, taking into account the world trends in the development of aviation and rocket and space technology (PC-1)		Priority Directions of Development of Mathematics and Mechanics / Приоритетные направления развития математики и механики Dynamics, Ballistics, Control of Motion of Aircraft and Spacecraft / Динамика, баллистика и управление движением летательных аппаратов Additional Topics of Theoretical Mechanics and Mechanics of Space Flight / Дополнительные разделы теоретической механики и механики космического полета Mathematical Basis of Ballistic Support of Spacecraft / Математические основы баллистического обеспечения полета космических аппаратов Mathematical Modelling and Control of Aircraft Movement / Математическое моделирование и управление движением летательных аппаратов
4	the ability to create and		riority Directions of

	<p>research mathematical and software models of products and processes associated with the functioning of objects of aviation and rocket technology (PC-2)</p>		<p>Development of Mathematics and Mechanics / Приоритетные направления развития математики и механики Dynamics, Ballistics, Control of Motion of Aircraft and Spacecraft / Динамика, баллистика и управление движением летательных аппаратов Additional Topics of Theoretical Mechanics and Mechanics of Space Flight / Дополнительные разделы теоретической механики и механики космического полета Mathematical Basis of Ballistic Support of Spacecraft / Математические основы баллистического обеспечения полета космических аппаратов Mathematical Modelling and Control of Aircraft Movement / Математическое моделирование и управление движением летательных аппаратов</p>
5	<p>the ability to select and transform mathematical models of phenomena, processes and systems in the field of rocket and space technology in order to study them (PC-4)</p>		<p>riority Directions of Development of Mathematics and Mechanics / Приоритетные направления развития математики и механики Dynamics, Ballistics, Control of Motion of Aircraft and Spacecraft / Динамика, баллистика и управление движением летательных аппаратов Additional Topics of Theoretical Mechanics and Mechanics of Space Flight / Дополнительные разделы теоретической механики и механики космического полета Mathematical Basis of Ballistic Support of Spacecraft / Математические основы баллистического</p>

			<p>обеспечения полета космических аппаратов Mathematical Modelling and Control of Aircraft Movement / Математическое моделирование и управление движением летательных аппаратов</p>
6	<p>the ability to develop mathematical models, methods, computer technologies and decision support systems in scientific research, design and engineering activities (PC-5)</p>		<p>riority Directions of Development of Mathematics and Mechanics / Приоритетные направления развития математики и механики Dynamics, Ballistics, Control of Motion of Aircraft and Spaceraft / Динамика, баллистика и управление движением летательных аппаратов Additional Topics of Theoretical Mechanics and Mechanics of Space Flight / Дополнительные разделы теоретической механики и механики космического полета Mathematical Basis of Ballistic Support of Spaceraft / Математические основы баллистического обеспечения полета космических аппаратов Mathematical Modelling and Control of Aircraft Movement / Математическое моделирование и управление движением летательных аппаратов</p>
7	<p>the ability to develop new mathematical models of objects of aviation and rocket-space technology, to develop analytical and approximate research methods (PC-6).</p>		<p>riority Directions of Development of Mathematics and Mechanics / Приоритетные направления развития математики и механики Dynamics, Ballistics, Control of Motion of Aircraft and Spaceraft / Динамика, баллистика и управление движением летательных аппаратов Additional Topics of Theoretical Mechanics and</p>

			Mechanics of Space Flight / Дополнительные разделы теоретической механики и механики космического полета Mathematical Basis of Ballistic Support of Spacecraft / Математические основы баллистического обеспечения полета космических аппаратов Mathematical Modelling and Control of Aircraft Movement / Математическое моделирование и управление движением летательных аппаратов
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3. Methods of conducting the practice

The methods of conducting Practice for obtaining professional skills and experience of professional activity (research) are as follows:

- stationary.

4. The scope of practice and types of educational work

Table 2 - The volume of practice and types of educational work

Type of educational work		Total, ak. hours	Semester	
			1	2
Contact work of the student with the teacher, including monitoring		44	22	22
Other forms of educational work, including keeping a practice diary and preparing a report to students		172	86	86
Type of certification test			Credit with an assessment	Credit with an assessment
Total labor intensity	academic hours	216	108	108
	credit	6	3	3
Duration of practice	weeks	Distributed	Distributed	Distributed

5. The place of conducting the practice

The internship place is provided to the student by the head of the internship on the basis of the relevant contracts concluded with the basic organizations.

The Department of Mechanics and Mechatronics of the Institute of Space Technologies of the RUDN serves as the bases for students to undergo practical training in obtaining professional skills and experience of professional activity (research).

A graduate student can come up with an initiative about the place of internship himself. The direction of the professional activity of the organization offered to students for practical training should correspond to the profile of the educational program and the types of professional activities for which the graduate of the program is preparing. The place of internship must be agreed with the head of the department/department, followed (if a positive decision is made) by concluding a corresponding contract with the organization proposed by the student.

Postgraduate students with disabilities and / or belonging to the category of «disabled» undergo practical training in an accessible form in the laboratories of the university, as well as in specialized organizations with which relevant contracts have been concluded and which have the ability (equipment, special facilities and infrastructure) to work with these categories of citizens.

6. The list of the planned results of the internship, correlated with the planned results of the development of the educational program

The result of the internship is the knowledge, skills, abilities and experience of professional activity that characterize the stages of competence formation and ensure the achievement of the planned results of mastering the educational program, presented in table 3.

7. Structure and content of the practice

<i>1 SEMESTER</i>					
№ i/o	Practice stages	Types of work carried out by students	Educational work on forms, ac. h.		Total, ak.h.
			Contact work	Other forms of educational work	
1	Organizational and preparatory	Getting an individual assignment for practice from a supervisor	1	-	1
2		Safety instructions at the workplace (in the laboratory and / or at work)	1	-	1
3	Main	Selection of the object and subject of scientific research	-	20	20
4		Setting the goals and objectives of the dissertation research	-	20	10
5		Search for information, compilation of thematic literature lists, catalogs, card files and other types of descriptions, classifications and typologies on the topic of the dissertation	-	20	10
		Current control of the internship by the manager	10	-	10
9	Reporting	Presentation and protection of the results of the work performed by the NI practice		26	
10		Intermediate certification (preparation and presentation) Intermediate certification (preparation and presentation)	10	-	10
IN TOTAL:			22	86	108

2 SEMESTER					
№ i/o	Practice stages	Types of work carried out by students	Educational work on forms, ac. h.		Total, ak.h.
			<i>Contact work</i>	<i>Other forms of educational work</i>	
1	Organizational and preparatory	Getting an individual assignment for practice from a supervisor	1	-	1
2		Safety instructions at the workplace (in the laboratory and / or at work)	1	-	1
3	Main	Familiarization with the educational work of the Department of Mechanics and Mechatronics	-	20	20
4		Development of educational and methodological materials	-	20	20
5		Conducting classes and implementing the developed training tools	-	20	20
8.		Current control of the internship by the manager	-	10	10
		Keeping an internship diary	10	-	10
9	Reporting	Preparation of a presentation on the passage of pedagogical practice	-	16	16
10		Intermediate certification (preparation and presentation)	10	-	10
IN TOTAL:			22	86	108

For students from among persons with disabilities and / or belonging to the category of «disabled», if necessary, the head of the practice develops individual tasks, a plan and an internship procedure taking into account the peculiarities of their psychophysical development, individual capabilities and health status, an educational program adapted for these students (if available) and in accordance with individual rehabilitation programs for disabled people.

8. Educational, scientific-research and scientific-production technologies used in practice

In the course of Practical training to obtain professional skills and experience of professional activity (research), the following educational technologies are used:

- contact work of the student with the teacher, which consists in obtaining an individual task, passing a safety briefing, receiving advice on internship issues, filling out current and reporting documentation, as well as protecting the internship report;
- other forms of educational work (educational activity), which include the main activity of the student to perform sections of the practice in accordance with the individual task, recommended methods and sources of literature, aimed at forming certain professional skills or experience of professional activity provided for by the internship program, as well as filling out current and reporting documentation, and preparing for the defense of the report on the internship.

During the internship, the following research and production technologies are used:

- mastering the methods of information analysis and interpretation of the results of research activities by students; mastering the methods of information analysis and interpretation of the results of research activities by students;

- performing written analytical and calculation tasks within the framework of the practice using recommended information sources;
- the use of various computer software products for graphic, analytical and/or production purposes (depending on the place of practice and the specifics of the task);
- the use of various electronic library and legal reference systems by students, etc.

9. Educational, methodological and informational support of educational practice

Basic literature:

1. Research of control systems: A textbook / Baranov V. V., Zaitsev A.V., Sokolov S. N.-M.: Alpina Publisher, 2013. - 216 p. Access mode. <http://www.studentlibrary.ru/book/ISBN9785890358271>
2. Lapaeva, M. G. Methodology of scientific research: a textbook for graduate students / M. G. Lapaeva, S. P. Lapaev; Ministry of Education and Science of the Russian Federation, Federal State Budgetary Educational Institution of Higher Education «Orenburg State University». - Orenburg: OSU, 2017. - 249 p.: ill. - Bibliogr. in the book. - ISBN 978-5-7410-1791-3; The same [Electronic resource]. - URL: <http://biblioclub.ru/index.php?page=book&id=485476> (06.05.2018). Fundamentals of scientific research. [Electronic resource] / Shklyar M. F.-M.: Dashkov and K, 2016. - <http://www.studentlibrary.ru/book/ISBN9785394018008.html>
3. Miroshnichenko N. A., Stefanov S. A. To help a young teacher. method. manual/ N. A. Miroshnichenko, S. A. Stefanov.- Odessa: Yuridichna literatura, 2003. -92 p. 2. Development of professionalism of a higher school teacher. studies.- method. manual. Ed. 2nd, ster./ V. S. Agapov [et al.]. - M.: Publishing house of RAGS, 2017. -384 p. http://lib.rudn.ru/MegaPro2/UserEntry?Action=Rudn_FindDoc&id=470098&idb=0
4. Skok G. B., Lygina N. I. How to design the educational process for the course: A textbook. Second edition, reprint. and supplement. - M.: Pedagogical Society of Russia. 2017 - - 96p. http://lib.rudn.ru/MegaPro2/UserEntry?Action=Rudn_FindDoc&id=470098&idb=0
5. Quality management of Education: A Practice-oriented monograph and a methodological guide/ Edited by M. M. Potashnik. M., 2016.

Additional literature:

1. Master's thesis [Electronic resource]: textbook / K. S. Idiatullina, I. Z. Garafiev. - Kazan: KNITU Publishing House, 2015. http://lib.rudn.ru/MegaPro2/UserEntry?Action=Rudn_FindDoc&id=418786&idb=0
2. Planning and organization of scientific research [Electronic resource]: textbook / V. I. Komlatsky, S. V. Loginov, G. V. Komlatsky. - Rostov n/A: Phoenix, 2017.- (Higher education) - Access mode http://lib.rudn.ru/MegaPro2/UserEntry?Action=Rudn_FindDoc&id=470098&idb=0

Periodicals:

1. Journal «Expert»
2. Journal «Automation and control in technical systems»
3. Journal «Control, communication and Security Systems»

Resources of the «Internet» information and telecommunications network:

1. EBS of RUDN and third-party EBS, to which graduate students of the university have access on the basis of concluded contracts:

- Electronic library system of RUDN-EBS RUDN
<http://lib.rudn.ru/MegaPro/Web>
- EBS «University Library Online» <http://www.biblioclub.ru>
- EBC Yurayt <http://www.biblio-online.ru>
- EBS «Student Consultant» www.studentlibrary.ru
- EBS «Lan» <http://e.lanbook.com/>

2. Databases and search engines:

- fund of legal and regulatory and technical documentation <http://docs.cntd.ru/>
- Yandex search engine <https://www.yandex.ru/>
- Google search engine <https://www.google.ru/>
- SCOPUS abstract database
<http://www.elsevierscience.ru/products/scopus/>

Software:

The use of specialized software during the practice is not provided.

Methodological materials for practical training, maintenance of current and preparation of reporting documentation for students (also available in the TUIS RUDN in the corresponding section of the discipline):

1. Methodological guidelines for practical training, maintenance of current and preparation of accounting documentation for students in the direction 01.06.01 Mathematics and Mechanics, program: Dynamics, ballistics and motion control of aircraft (technical sciences) (appendix 2).

10. Material and technical support of pedagogical practice

For successful Teaching practice, you need: a workplace, a computer, a printer, a library fund.

To process the materials collected by the graduate student during the internship, there is access to computer classes.

The library fund should provide graduate students with basic literature in the amount of 0.5 copies per person.

Also, graduate students are given the opportunity to use the Internet in an educational institution.

11. Forms of practice certification

During the internship, the teacher carries out the current control of the student's performance of the task for practice. Based on the results of the practice, an interim

certification is provided in the form of a **credit with an assessment** (based on the results of the defense of the practice report).

12. The fund of assessment funds for conducting intermediate certification of students in the discipline

The fund of evaluation funds formed for conducting current monitoring of academic performance and intermediate certification of students in Practice to obtain professional skills and experience of professional activity (research) is presented in *appendix 1* to the work program of the practice and includes:

- the list of competencies formed during the internship;
- description of indicators and criteria for assessing competencies, description of assessment scales;
- standard control tasks or other materials necessary for the assessment of knowledge, skills, abilities and (or) experience of activity that characterize the level of competence formation;
- methodological materials that define the procedures for evaluating knowledge, skills, and (or) experience of activity that characterize the level of competence formation.

Developers:

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