

*Federal State Autonomous Educational Institution  
higher education  
Peoples' Friendship University of Russia  
Academy of Engineering*

## **WORKING PROGRAM OF PRACTICE**

**Practice type (name):** «Practice in Obtaining Professional Skills and Professional Experience (Research Practice)»

**Direction of training:** 08.06.01 "Engineering and construction technologies"

**Profile / specialization:** 05.23.17 Structural mechanics

Moscow,

2020


The working program of the practice was developed in accordance with the curriculum for the direction 08.06.01 "Engineering and technology of construction", 2017 set, approved at a meeting of the Academic Council of the Engineering Academy \_\_\_ / \_\_\_\_\_ / 20\_\_ (protocol No. \_\_\_\_\_).

The working program of research practice was considered at a meeting of the department / department of construction \_\_\_ / \_\_\_\_\_ / 20\_\_ (protocol No. \_\_\_\_\_).

**Developers:**

|                     |  |                   |
|---------------------|--|-------------------|
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| _____               | _____  | _____             |
| _____               | _____  | _____             |

**Head of department of Civil Engineering**

|   |                   |
|---|-------------------|
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| _____   | _____             |
| signature   | initials, surname |

## 1. The purpose and objectives of the practice

**The objectives** of the research practice are to consolidate and deepen theoretical training, the acquisition of practical skills by graduate students in the field of construction, as well as the collection, processing and analysis of the material necessary for writing a dissertation for the degree of candidate of technical sciences.

In particular, the purpose of passing research practice is to develop the following practical skills and abilities among graduate students:

- the ability to demonstrate knowledge of fundamental and applied disciplines of the postgraduate program;
- the ability to use in-depth knowledge of legal and ethical norms in assessing the consequences of their professional activities, in the development and implementation of socially significant projects;
- the ability to organize, improve and master new technological processes of the production process at an enterprise or site, control over the observance of technological discipline, maintenance of technological equipment and machines.

**The main objectives** of the research practice in the direction of training 08.06.01 "Engineering and technology of construction" are:

- independent analysis of scientific and technical information, domestic and foreign experience on the topic of the dissertation;
- setting a scientific and technical problem, choosing methodological methods and means of solving it, preparing data for writing a dissertation;
- setting up and conducting experiments, collection, processing and analysis of results, identification of theory and experiment;
- development and use of databases and information technologies for solving scientific, technical and managerial problems in the design of building structures.

## 2. Place of practice in the structure of EPOP HE

Research practice in the direction of preparation 08.06.01 "Engineering and technology of construction" refers to the variable part of Block 2 of the curriculum. Its passage is based on the material of previous disciplines and / or practices, and it is also basic 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*

| <b>№</b> | <b>Preceding disciplines / practices</b>  | <b>Subsequent disciplines</b>             |
|----------|---|---|
| 1        | Foreign Language / Russian as a Foreign Language                                      | Scientific Research 2                     |
| 2        | History and Philosophy of Science   | State exam                                |
| 3        | Methodology of Scientific Research  | PhD Qualification Thesis and Presentation |
| 4        | Scientific Seminar  |   |
| 5        | Building designs, buildings and constructions: the theory of buildings and structures |   |
| 6        | Advanced Structural Mechanics   |   |
| 7        | Technology and Organization of Construction   |   |
| 8        | Analysis and Design of Structural Systems   |   |
| 9        | Scientific Research   |   |

### 3. Practice methods

The methods of conducting research practice in the direction of training 06/08/01 "Engineering and technology of construction" are as follows:

- stationary;
- field practice.

### 4. The scope of practice and types of educational work

*Table 2 - The scope of practice and types of educational work*

| Type of educational work   |                | Total, ac. hours | Semester      |     |  |
|----------------------------|----------------|------------------|---------------|-----|--|
|                            |                |                  | 7             | 8   |  |
| Contact work               |                | 8                | 4             | 4   |  |
| Independent work           |                | 172              | 86            | 86  |  |
| Control                    |                | 36               | 18            | 18  |  |
| Type of certification test |                |                  | Graded credit |     |  |
| Total labor intensity      | academic hours | 216              | 108           | 108 |  |
|                            | credits        | 6                | 3             | 3   |  |
| Duration of practice       | weeks          | 21               | 11            | 10  |  |

### 5. Place of practice

The bases for students to undergo research practice in the direction 08.06.01 "Engineering and construction technologies" are:

- structural divisions and laboratories of the university.

If necessary, the practice can be organized on the basis of RUDN University partner organizations.

Persons with disabilities and / or those belonging to the category of "disabled" undergo practical training, in an accessible form for them in the laboratories of the university, as well as in specialized organizations with which the relevant contracts have been concluded and which have the opportunity (equipment, special means 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

Research practice in the direction 08.06.01 "Engineering and construction technologies" is aimed at developing the following competencies among students:

- willingness to participate in the work of Russian and international research teams to solve scientific and scientific and educational problems (UC-3);
- the ability to plan and solve problems of their own professional and personal development (UC-6).
- the ability to professionally operate modern research equipment and instruments (GPC-4);
- the ability to professionally present the results of their research and present them in the form of scientific publications and presentations (GPC-5);
- readiness to organize the work of the research team in the field of construction (GPC-7);

- possession of methods for the development of scientific and methodological foundations of research, improvement, theoretical, experimental and feasibility studies for the use of various technical solutions and technologies in construction (PC-1);
- possession of linear and nonlinear mechanics of structures and structures, physical and mathematical models, analytical and numerical methods of their calculation, including the calculation of structures and structures for reliability in extreme operating conditions (PC-2).

The result of the practice is knowledge, skills, skills and experience of professional activity, which characterize the stages of the formation of competencies and ensure the achievement of the planned results of mastering the educational program, presented in Table 3.

*Table 3 - Learning outcomes in the discipline, correlated with the planned results of mastering EP HE*

| <b>Competence</b>   | <b>Knowledge</b>   | <b>Ability</b>  | <b>Skills</b>   |
|---|--|---|---|
| 1   | 2  | 3   | 4   |
| possession of methods for the development of scientific and methodological foundations of research, improvement, theoretical, experimental and feasibility study of the use of various technical solutions and technologies in construction (PC-1)                                | basic methods, principles of scientific and experimental research of structures, complexes and their structural elements         | carry out research in the field of scientific and experimental activities using modern technologies, standards, methods                           | development of plans, programs and methods for planning experiments   |
| possession of linear and nonlinear mechanics of structures and structures, physical and mathematical models, analytical and numerical methods of their calculation, including the calculation of structures and structures for reliability in extreme operating conditions (PC-2) | basic methods, principles of static and dynamic calculations of structures and their structural elements for strength, stability | own modern software and computing systems for static and dynamic calculations of structures and their structural elements for strength, stability | possession of the mathematical apparatus, performing practical calculations of structures and their structural elements for strength, stability |

## 7. Practice structure and content

| № | Practice stages                | Types of work carried out by students   | Educational work on forms, academic hours |                                 | Total, academic hours |
|---|--------------------------------|---|---|---------------------------------|-----------------------|
|   |                                |   | Contact work                              | Other forms of educational work |                       |
| 1 | Organizational and preparatory | Introductory lecture. Goals and objectives of educational building practice. The procedure for the preparation, execution and protection of the report. | 4   | -                               | 6                     |
| 2 |                                | Safety briefing   | 2   | -                               | 2                     |
| 3 | Main                           | Collection and processing of information obtained from various sources  | -   | 80                              | 80                    |
| 4 |                                | Processing and analysis of the information received, preparation of a report and diary on prac-   | -   | 100                             | 100                   |

|   |           |  |          |            |            |
|---|-----------|--|----------|------------|------------|
|   |           | tice   |          |            |            |
| 5 |           | Ongoing control of the internship by the head                                      | 2        | -          | 4          |
| 6 |           | Keeping an internship diary  | -        | 10         | 10         |
| 7 | Reporting | Preparing an internship report   | -        | 10         | 10         |
| 8 |           | Intermediate attestation (preparation for protection and protection of the report) | -        | 8          | 18         |
|   |           | <b>TOTAL:</b>  | <b>8</b> | <b>208</b> | <b>216</b> |

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 procedure for passing the practice, taking into account the peculiarities of their psychophysical development, individual capabilities and health status, an educational program adapted for these students (if any) and in accordance with individual rehabilitation programs for the disabled.

### **8. Educational, research and production technologies used in practice**

In the process of research practice in the direction 08.06.01 "Engineering and construction technologies", the following educational technologies are used:

- contact work between the student and the teacher, which consists in receiving an individual assignment, undergoing 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 activities), which include the main activity of the student on the implementation of sections of practice in accordance with the individual task, recommended methods and literature sources, aimed at the formation of certain professional skills or experience of professional activity provided for by the practice program, as well as filling out the current and reporting documentation, and preparing for the defense of the report on the internship.

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

- mastering by students the methods of information analysis and interpretation of the results of research activities;
- execution of written analytical and calculation tasks within the framework of practice using recommended information sources;
- the use of various computer software products for graphic, analytical and / or industrial purposes (depending on the place of internship and the specifics of the task);
- use by students of various electronic library and legal reference systems, etc.

### **9. Educational-methodical and informational support of educational practice**

*Main literature:*

1. Banshchikova IA, Complex ANSYS: nonlinear strength analysis of structures [Electronic resource]: tutorial / Banshchikova IA. - Novosibirsk: Publishing house of NSTU, 2015. -- 94 p. - ISBN 978-5-7782-2816-0
2. Moskalev NS, Metal structures [Electronic resource]: Textbook / NS. Moskalev, Ya.A. Pronosin. - M.: Publishing house ASV, 2014. -- 344 p. - ISBN 978-5-93093-500-4 - Access mode: <http://www.studentlibrary.ru/book/ISBN9785930935004.html>

3. Ibragimov AM, Welding of building metal structures [Electronic resource]: Textbook / Ibragimov AM, Parlashkevich V.S. - M.: Publishing house ASV, 2015 .-- 176 p. - ISBN 978-5-93093-891-

*Additional literature:*

1. Automated information systems in the economy / ed. M.V. Vasilyeva. - Moscow: Student Science, 2012. - Part 1. Collection of student works. - 1064 p. - (University science to help the student). - ISBN 978-5-00046-053-5; Access mode: <http://biblioclub.ru/index.php?page=book&id=225482>

2. Fundamentals of scientific research and patenting: teaching aid / comp. V.A. Valkov, V.A. Golovatyuk, V.I. Kochergin, S.G. Shchukin. - Novosibirsk: Novosibirsk State Agrarian University, 2013 .-- 228 p. Access mode: <http://biblioclub.ru/index.php?page=book&id=230540>

3. Sidorov VN, The finite element method in the design of structures. Theory, algorithm, examples of calculations in the SIMULIA Abaqus software package [Electronic resource]: Textbook / VN Sidorov, VV Vershinin. - M.: Publishing house ASV, 2015 .-- 288 p. - ISBN 978-5-4323-0090-4

4. Radin VP, The finite element method in dynamic problems of resistance of materials [Electronic resource] / Radin VP, Samogin Yu.N., Chirkov VP. - M.: FIZMATLIT, 2013 .-- 316 p. - ISBN 978-5-9221-1485-1

*Resources of the information and telecommunications network "Internet":*

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

- Electronic library system RUDN - EBS RUDN <http://lib.rudn.ru/MegaPro/Web>
- EBS "University Library Online" <http://www.biblioclub.ru>
- EBS Yurayt <http://www.biblio-online.ru>
- EBS "Student Consultant" [www.studentlibrary.ru](http://www.studentlibrary.ru)
- EBS "Doe" <http://e.lanbook.com/>

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/>
- SCOPUS abstract database <http://www.elsevierscience.ru/products/scopus/>

*Software:*

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

*Methodological materials for passing practice, maintaining current and preparing reporting documentation for students (also posted in the TUIS RUDN University in the relevant section of the discipline):*

1. Methodical instructions for passing practice, maintaining current and preparing reporting documentation for students in the direction 08.06.01 "Engineering and construction technologies" (Appendix 2).

## **10. Material and technical support of educational practice**

| <b>Auditorium with a list of logistics</b>   | <b>Location</b>                         |
|--|---|
| <p>Educational laboratory for laboratory and practical exercises - Laboratory of Building Materials and Building Structures, room. No. 24a. Combined testing machine C040N + C092-11 "MATESTA", Vibrating plates laboratory C282 MATEST and SMZH-539, Chamber-cabinet for normal hardening and wet storage KNT-72, Universal steaming chamber KUP-1, molds for concrete samples, concrete mixers-2 pcs., Concrete strength meter POS-50MG4, Vika devices, Aistova's device, Electronic moisture meter - MG4U, Ultrasonic flaw detector A1220 MONOLITH, Shaking table with a cone and ruler, etc. installations and testing devices.</p> <p>Educational laboratory for laboratory and practical training - Laboratory of Soil Mechanics, No. 520a. Training and testing complex ASIS-1 "Automated test systems in construction", laboratory scales MWR-3000, drying cabinet, laboratory glassware, etc.</p> | <p>Moscow, st.<br/>Ordzhonikidze, 3</p> |

## **11. Practice attestation forms**

In the process of passing the practice, the teacher carries out current control of the student's implementation of the practice assignment. Based on the results of the practice, intermediate certification is provided in the form of a set-off with an assessment (based on the results of the defense of the report on practice).

## **12. Fund of assessment tools for intermediate certification of students in practice**

The fund of assessment tools, formed for the current monitoring of progress and intermediate certification of students in research practice, is presented in Appendix 1 to the work program of the practice and includes:

- a list of competencies formed in the course of internship;
- description of indicators and criteria for assessing competencies, description of assessment scales;
- typical control tasks or other materials necessary to assess knowledge, skills, skills and (or) experience of activities, characterizing the level of competence formation;
- methodological materials that determine the procedures for assessing knowledge, skills, skills and (or) experience of activities, characterizing the level of competence formation.