

**Federal State Autonomous Educational Institution for Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
NAMED AFTER PATRICE LUMUMBA
(RUDN University)**

Academy of Engineering

(name of the educational division - developer of the HEP HE)

INTERNSHIP SYLLABUS

Research Work (Mining Geology). Part 2

(internship title)

Industrial

(internship type)

Recommended by the Didactic Council for the Education Field of:

05.04.01 Geology

(code and name of the Higher Education Field)

**The student's internship is implemented within the Higher Education Programme of
Higher Education (HEP HE):**

Mining Geology

(name (profile/specialization) of the Higher Education Program)

1. INTERNSHIP AIM

The aim of the Internship «Research Work (Mining Geology). Part 2» is to gain knowledge, skills and experience in the field conducting a holistic study or a separate part of it in order to increase the efficiency of mining technologies based on the development of new (improving existing) approaches to managing geological data that characterize the stages of competency formation and ensure the achievement of the planned results of mastering the educational program.

The main objectives of the discipline are:

- formation of readiness for self-development, self-realization, use of creative potential;
- formation of skills to draw up, in accordance with existing requirements, reports on research, reviews, publications based on the results of research;
- formation of the ability to solve specific research and practical problems in accordance with the direction of scientific research.

2. REQUIREMENTS FOR LEARNING OUTCOMES

The internship «Research Work (Mining Geology) Part 2» is aimed at the formation of the following competencies (parts of competencies) of students:

Table 2.1. List of competencies formed by students during the practice (learning outcomes based on the results of the practice)

Code	Competence	Competence achievement indicators (within this practice)
GPC-1	Capable of using the theoretical foundations of special and new sections of geological sciences to solve professional activity problems.	GPC-1.1. Knowledge of the basics of special and new sections of geological sciences; GPC-1.2. GPC-1.2. Selects a method or technique to solve a professional problem; GPC-1.3; GPC-1.3. Knows how to select a method or method of solving a professional problem.
GPC-2	Able of independently formulating the research objectives and establishing a sequence for resolving professional problems.	GPC-2.1. Knows the basics and methods of organizing research activities, methods of setting goals and methods of achieving them; GPC-2.2. is able to develop research methods; GPC-2.3. has methods of establishing cause-effect relationships and identifying the most significant among them and skills of independent formulation of research objectives.
GPC-3	Accomplished of totally independent generalizing the results obtained while solving professional problems and developing recommendations for their practical application.	GPC-3.1 Know the theoretical foundations of the generalization of results and development of recommendations; GPC-3.2. be able to summarize the results obtained in the process of solving professional tasks, develop recommendations for their practical use; GPC-3.3. Have the skills to summarize the results obtained in the process of solving professional tasks and develop recommendations for their practical use.

Code	Competence	Competence achievement indicators (within this practice)
GPC-4	Suitable of representing, protecting, and disseminating the outcomes of their professional activities.	GPC-4.1 Knows the main results of his/her scientific activity, methods of their presentation, protection and dissemination; GPC-4.2. is able to understand and analyze the results of professional activities, use own scientific achievements. discuss and disseminate the results of their professional activities; GPC-4.3. Have the skills to analyze, discuss and disseminate the results of professional activities
PC-1	Capable of processing geological data, modeling ore bodies with modern software, resolving quality and mineral reserve management issues, and developing engineering and geological surveying measures for the territory.	PC-1.3. Have the skills to process geological data and build models of ore bodies using modern software.
PC-2	Capable of justifying the need, choosing the best methodology, planning, implementing, interpreting results, and supervising geophysical work at various stages of mineral site development.	PC-2.2 Know how to select the best methodology, design, implement, interpret the results of geophysical works; PC-2.2 Know how to select the best methodology, design, implement, interpret the results of geophysical works.
PC-3	Capable of projecting, implementing, and managing a hydrogeological study of the territory during the exploration and development of a mineral deposit.	PC-3.3 Be able to apply the knowledge and skills obtained in the design, implementation and management of the hydrogeological study of the territory at the stage of exploration and development of mineral deposits.
PC-4	Capable of designing, assisting with, and supervising a geologic study of a subsoil area at various stages of development.	PC-4.2 Be able to apply methodological solutions in the design and implementation of the geological study of a subsoil area at various stages of its development; PC-4.3 Be able to apply the acquired knowledge and skills in the design, support and management of the geological study of a subsoil area at various stages of its development.

3. INTERNSHIP IN HIGHER EDUCATION PROGRAMME STRUCTURE

«Research Work (Mining Geology). Part 2» refers to the compulsory part.

As part of the HEP HE, students also master disciplines and/or other practices that contribute to the achievement of the planned learning outcomes of the practice «Research Work (Mining Geology). Part 2».

Table 3.1. The list of the HEP HE's components that contribute to the achievement of the planned learning outcomes of the practice

Code	Name of competence	Previous disciplines/modules, practices*	Subsequent disciplines/modules, practices*
GPC-1	Capable of using the theoretical foundations of special and new sections of geological sciences to	Geological and Geophysical Basics of Mineral Prospecting and Exploration	Final State Examination

Code	Name of competence	Previous disciplines/modules, practices*	Subsequent disciplines/modules, practices*
	solve professional activity problems.	Engineering and Geological Support of Subsoil Use Mining Geology Hydrogeology Mining Hydrogeology	
GPC-2	Able of independently formulating the research objectives and establishing a sequence for resolving professional problems.	Geological and Geophysical Basics of Mineral Prospecting and Exploration Modelling of Mineral Deposits Applied Groundwater Modeling	Final State Examination
GPC-3	Accomplished of totally independent generalizing the results obtained while solving professional problems and developing recommendations for their practical application.	Sustainable Mining	Final State Examination
GPC-4	Suitable of representing, protecting, and disseminating the outcomes of their professional activities.	Digital Technologies in Geology Sustainable Mining	Final State Examination
PC-1	Capable of processing geological data, modeling ore bodies with modern software, resolving quality and mineral reserve management issues, and developing engineering and geological surveying measures for the territory.	Geological and Geophysical Basics of Mineral Prospecting and Exploration Engineering and Geological Support of Subsoil Use Modelling of Mineral Deposits	Pre-Graduation Practice Final State Examination
PC-2	Capable of justifying the need, choosing the best methodology, planning, implementing, interpreting results, and supervising geophysical work at various stages of mineral site development.	Regional Geology. Geology of Central and Southern Africa Geological and Geophysical Basics of Mineral Prospecting and Exploration Mining Geology Modelling of Mineral Deposits Hydrogeology Mining Hydrogeology Introductory Practical Training	Pre-Graduation Practice Final State Examination
PC-3	Capable of projecting, implementing, and managing a hydrogeological study of the territory during the exploration and development of a mineral deposit.	Mining Geology Hydrogeology Groundwater Dynamics Mining Hydrogeology Applied Groundwater Modeling	Pre-Graduation Practice Final State Examination
PC-4	Capable of designing, assisting with, and supervising a geologic study of a subsoil area at various stages of development.	Regional Geology. Geology of Central and Southern Africa Geological and Geophysical Basics of Mineral Prospecting and Exploration Mining Geology Modelling of Mineral Deposits Hydrogeology Mining Hydrogeology Introductory Practical Training	Pre-Graduation Practice Final State Examination

* - to be filled in accordance with the matrix of competencies and Sustainable Educational Plan HEP HE

4. SCOPE OF PRACTICE

Course workload «Research Work (Mining Geology). Part 2» is 6 credit units (216 academic hours).

5. CONTENT OF PRACTICE

*Table 5.1. The content of the research work (hereinafter referred to as "RW") **

Name of practice section	Contents of the section (topics, types of practical activities)	Workload, ac. hrs.
<i>Semester 3 – Part 2</i>		
Section 1. Goal setting and organization of RW	Workplace safety instruction (in the laboratory and/or pro-duction site)	1
	Assignment of an individual task from the supervisor: 1.1. setting goals and objectives for ongoing research and development; 1.2. methods of analysis and generalization of domestic and international experience in the relevant field of research; 1.3. methods and means of planning and organizing research and development; 1.4. methods of conducting experiments and observations, generalization and processing of information; 1.5. formulating requirements for the structure, content and design of scientific and technical reports, publications, reviews based on the results of research.	9
Section 2. Justification of the research methodology	2.1. substantiation of the relevance of the chosen topic of research work; 2.2. definition of the object and subject of research; 2.3. choice of method (methodology) of the study; 2.4. development of a research plan; 2.5. analysis of the state of the issue on the selected research topic; 2.6. preparation of a literature review	36
Section 3. Performing an experiment / building a model in accordance with the theme of the Graduate Qualification Work	3.1. review of theoretical material on the chosen topic; 3.2. implementation of the experiment / model building; 3.3. analysis of the obtained experimental results; 3.4. assessment of the convergence of the obtained results with theoretical assumptions; 3.5. analysis of the prospects for further research in the chosen direction.	142
Section 4. Formation of the report	4.1. evaluation of the effectiveness of the solutions proposed in R&D; 4.2. formulation of conclusions on R&D; 4.3. preparation of a research report.	18
Ongoing supervision of the internship by the supervisor		1
Preparation for defense and defense of the RW report		9
TOTAL:		216

* - the content of RW by sections and types of practical training is FULLY reflected in the student's RW report.

6. MATERIAL AND TECHNICAL SUPPORT FOR PRACTICE

During stationary RW at the partner university (MISIS University), depending on individual assignment, classrooms for lecture and/or practical classes, geological and mine-surveyor information technology laboratory, including computers with specialized software, geology basics classroom, including a collection of rocks and minerals, library of the partner university (MISIS), that comply with current sanitary and fire safety norms as well as safety requirements at the enterprise, workplace and when working with certain production/laboratory equipment can be used.

In case of stationary or offsite internship in Moscow or outside Moscow, students are provided with rooms that comply with current sanitary and fire safety norms, as well as safety requirements at the enterprise, workplace and when working with certain production/laboratory equipment.

The student can come up with the initiative of the place of RW. The direction of professional activity of the organization proposed by the student for the RW should correspond to the profile of the educational program and types of professional activity, for which the graduate of the program is preparing. The place of RW must be agreed with the head of the department with the subsequent (in the case of a positive decision) the conclusion of the relevant contract with the proposed organization of the student.

7. PRACTICE METHOD

«Research Work (Mining Geology). Part 2» can be carried out both in the structural divisions of the partner university (MISIS University) or in the organizations of Moscow (inside practice), and at bases located outside of Moscow (outside practice).

The practice on the basis of an external organization (University) is carried out on the basis of an appropriate agreement, which specifies the terms, place and conditions for conducting an internship in the host organization.

The timing of the practice corresponds to the period specified in the academic schedule of the HEP HE. The timing of the internship can be adjusted upon agreement with the Department of Educational Policy and the Department for the Organization of Practices and Student Employment at RUDN University.

8. EDUCATIONAL AND METHODOLOGICAL AND INFORMATION SUPPORT FOR PRACTICE

Main literature:

1. Ahmed Hassan Ahmed. "Mineral Deposits and Occurrences in the Arabian–Nubian Shield". Springer Cham, 2022 - <https://doi.org/10.1007/978-3-030-96443-6>
2. Rustan A. "Mining and rock construction technology desk reference. Rock mechanics, drilling and blasting". CRC Press, London, 2011 - <https://www.geokniga.org/books/30944>
3. Gangopadhyay S. "Engineering geology". Oxford university press, 2013 г - <https://www.geokniga.org/books/23310>

The basic literature can be expanded and recommended by the head of RW individually to each student in accordance with the individual assignment.

Additional literature:

1. Ye Zhang "Introduction to Geostatistics". University of Wyoming, 2011 - <http://geofaculty.uwyo.edu/yzhang/files/Geosta1.pdf>
2. Mohammad Ehteram, Zohreh Sheikh Khozani, Saeed Soltani-Mohammadi, Maliheh Abbaszadeh. "Estimating Ore Grade Using Evolutionary Machine Learning Models". Springer Singapore, 2022 - <https://doi.org/10.1007/978-981-19-8106-7>
3. United Nations Economic Commission for Africa. (2017). Impact of illicit financial flows on domestic resource mobilization: Optimizing revenues from the mineral sector in Africa. <https://repository.uneca.org/handle/10855/23862>

Additional literature may be expanded and/or modified and recommended by the supervisor of RW individually to each student in accordance with the individual assignment.

Internet-(based) sources:

1. Electronic libraries with access for RUDN students:
 - RUDN Electronic Library System – RUDN ELS <http://lib.rudn.ru/MegaPro/Web>
 - ELS “University Library Online” <http://www.biblioclub.ru>
 - ELS Yurayt <http://www.biblio-online.ru>
 - ELS “Student Consultant” www.studentlibrary.ru
 - ELS “Lan” <http://e.lanbook.com/>
 - ELS “Trinity Bridge” <http://www.trmost.ru>
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/>
 - Геологический портал GeoKniga <http://www.geokniga.org>
 - Geological Survey of Tanzania (GST) <https://www.gst.go.tz>
 - Tanzania Geological Society (TGS) <https://www.tgs.or.tz>
 - <https://www.gst-datashop.com>

*Educational and methodological materials for the practice, filling out a dairy/journal and preparing a practice report *:*

1. Rules for safe working conditions and fire safety during the practice «Research Work (Mining Geology). Part 2» (initial briefing).

2. Guidelines for filling in a dairy/journal by students and preparing a RW report.

* - all educational and methodological materials for independent work of students are placed in accordance with the current procedure on the page of the subject in LMS TUIS!

8. ASSESSMENT AND EVALUATION TOOLKIT AND GRADING CRITERIA

Assessment and Evaluation Toolkit (AET), Grading System (GS)* for assessing the level of competence (part of competence) for the Internship «Research Work (Mining Geology). Part 2» are presented in the Appendix to the Internship Syllabus of the subject.

* - AET and GS are formed on the basis of the requirements of the relevant local normative act of the RUDN University.

DEVELOPERS:

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Position, Department

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