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

Academy of Engineering

educational division (faculty/institute/academy) as higher education programme developer

INTERNSHIP SYLLABUS

Research Work

internship title

Industrial

internship type

Recommended by the Didactic Council for the Education Field of:

05.04.01 Geology

field of studies / speciality code and title

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

Mining Geology

higher education programme profile/specialisation title

1. INTERNSHIP GOAL(s)

The goal of the internship «Research Work» is the consolidation of theoretical knowledge gained in the learning process, the acquisition of practical skills and the formation of professional competencies in the field of research work related to solving complex professional problems in geology, geophysics and hydrogeology of ore deposits.

2. REQUIREMENTS FOR LEARNING OUTCOMES

The internship implementation is aimed at the development of the following competences (competences in part):

Table 2.1. List of competences that students acquire during the internship

Competence code	Competence descriptor	Competence formation indicators (within this course)
GPC-1	Capable of using the theoretical foundations of special and new sections of geological sciences to solve professional activity problems.	GPC-1.1. Knows the fundamentals of special and new sections of geological sciences; GPC-1.2. Selects a method or methodology for solving a professional problem; GPC-1.3. Knows how to select a method or methodology for solving a professional problem.
GPC-2	Able to 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. Knows how 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 Knows the theoretical foundations of the generalization of results and development of recommendations; GPC-3.2. Knows how to summarize the results obtained in the process of solving professional tasks, develop recommendations for their practical use; GPC-3.3. Has the skills to summarize the results obtained in the process of solving professional tasks and develop recommendations for their practical use.
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. Knows how 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. Has 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	PC-1.2. Knows how to apply methods of geological data processing, build ore body models, solve problems on quality and mineral reserves management, develop measures for engineering and geological study of the territory; PC-1.3. Has the skills to process geological data and construct ore body models using modern software.

Competence code	Competence descriptor	Competence formation indicators (within this course)
	geological surveying measures for the territory.	
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 Knows how to select the best methodology, design, implement, interpret the results of geophysical works; PC-2.3 Knows how to justify and select optimal methodology, manage geophysical work at different stages of subsoil area development.
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 Knows how 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 Knows how 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 Knows how 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

The internship refers to the elective component of (B2) block of the higher educational programme curriculum.

Within the higher education programme students also master other disciplines (modules) and / or internships that contribute to the achievement of the expected learning outcomes as results of the internship.

Table 3.1. The list of the higher education programme components that contribute to the achievement of the expected learning outcomes as the internship results.

Competence code	Competence descriptor	Previous courses/modules, internships*	Subsequent courses/modules, internships*
GPC-1	Capable of using the theoretical foundations of special and new sections of geological sciences to solve professional activity problems.	Geological and Geophysical Basics of Mineral Prospecting and Exploration Engineering and Geological Support of Subsoil Use Mining Geology Mining Hydrogeology Work Experience Internship	Graduate Qualification Work
GPC-2	Able to 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 Work Experience Internship	Graduate Qualification Work

Competence code	Competence descriptor	Previous courses/modules, internships*	Subsequent courses/modules, internships*
GPC-3	Accomplished of totally independent generalizing the results obtained while solving professional problems and developing recommendations for their practical application.	Sustainable Mining Work Experience Internship	Graduate Qualification Work
GPC-4	Suitable of representing, protecting, and disseminating the outcomes of their professional activities.	Digital Technologies in Geology Sustainable Mining Work Experience Internship	Graduate Qualification Work
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 Academic Internship (Introductory Internship) Work Experience Internship	Pre-Graduation Practice Graduate Qualification Work
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.	Geological and Geophysical Basics of Mineral Prospecting and Exploration Mining Geology Modelling of Mineral Deposits Mining Hydrogeology Academic Internship (Fundamentals of Scientific Research) Academic Internship (Introductory Internship) Work Experience Internship	Pre-Graduation Practice Graduate Qualification Work
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 Mining Hydrogeology Applied Groundwater Modeling Work Experience Internship	Pre-Graduation Practice Graduate Qualification Work
PC-4	Capable of designing, assisting with, and supervising a geologic study of a subsoil area at various stages of development.	Geological and Geophysical Basics of Mineral Prospecting and Exploration Mining Geology / Modelling of Mineral Deposits Hydrogeological Module Mining Hydrogeology Academic Internship (Fundamentals of Scientific Research) Work Experience Internship	Pre-Graduation Practice Graduate Qualification Work

* To be filled in according with the competence matrix of the higher education programme.

4. INTERNSHIP WORKLOAD

The total workload of the internship is 15 credits (540 academic hours).

5. INTERNSHIP CONTENTS

*Table 5.1. Internship contents**

Modules	Contents (topics, types of practical activities)	Workload, academic hours
Module 1. Organizational and preparatory	Assignment of an individual task from the supervisor	1
	Workplace safety instruction (in the laboratory and/or production site)	1
Module 2. Main	Search and collection of materials and data in accordance with the individual task, determine the methods and sequence of tasks	18
	Conducting research work (topic chosen by the supervisor): - definition of goals and objectives; - definition of the methods of solving the problems; - theoretical substantiation of the work performed; - practical problem solving (diagnostic, conducting simulations or others); - analyzing the results; - formulating a conclusion.	430
	Registration of the results of research in the form of a report, including a bibliographical review (history of geological study) of the object of research. Approbation of the results of research work (variably, depending on the individual assignment): - presentation at the conference (preparation of abstracts, presentation and presentation); - publication of a scientific article (preparation of a manuscript, selection of a journal, design in accordance with the requirements, sending the manuscript to the editorial board of the journal) – at the request of the supervisor.	70
Ongoing supervision of the internship by the supervisor		2
Preparation of Research Work report		9
Preparing for defence and defending the internship report		9
TOTAL:		540

* The contents of internship through modules and types of practical activities shall be FULLY reflected in the student's internship report.

6. INTERNSHIP EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

During stationary internship at the University of Dar es Salaam (UDSM), depending on individual assignment, any laboratories of the School of Mines and Geosciences (SoMG), the UDSM Library, 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 Dar es Salaam (Tanzania) or outside Dar

es Salaam, 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 internship. The direction of professional activity of the organization proposed by the student for the internship 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 internship must be agreed with the head of the SoMG.

The SAFETY REQUIREMENTS at the enterprise, workplace (including the SoMG of UDSM) and during the work with certain production/laboratory equipment incorporate/include applicable labor protection rules, fire safety rules and other applicable local regulations.

7. INTERNSHIP LOCATION AND TIMELINE

«Research Work» can be carried out both at the structural divisions of UDSM and at Dar es Salaam -based organisations (inside practice), and as well as those located outside Dar es Salaam (outside practice).

The period of the internship, as a rule, corresponds to the period indicated in the training calendar of the higher education programme. The period of internship must be agreed with the head of the SoMG.

8. RESOURCES RECOMMENDED FOR INTERNSHIP

Main readings:

1. Kennett, Brian. *Planning and Managing Scientific Research: A Guide for the Beginning Researcher*. ANU Press, 2014. <http://www.jstor.org/stable/j.ctt6wp816>

URL: <https://directory.doabooks.org/handle/20.500.12854/34840>

URL: <https://library.oapen.org/bitstream/20.500.12657/33421/1/477381.pdf>

2. Roger Marjoribanks. *Geological Methods in Mineral Exploration and Mining*. Springer-Verlag Berlin Heidelberg, 2010 (Second Edition). - P. 233. — URL: <https://www.geokniga.org/bookfiles/geokniga-geological-methods-mineral-exploration-and-mining.pdf>

3. Griffiths D.H., King R.F. *Applied Geophysics for Geologists and Engineers. The Elements of Geophysical Prospecting*. 2nd Ed. — Pergamon Press, 1988. — 236 p. — ISBN: 0-08-022071-1. — URL: <https://www.geokniga.org/bookfiles/geokniga-applied-geophysics-geologists-and-engineers.pdf>

<https://www.geologyseeker.com/2022/05/geological-methods-in-mineral.html>

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

Additional readings:

1. Haldar S.K. *Mineral Exploration Principles and Applications*, 2nd Edition. Elsevier, 2018. — 378 p. — URL: <https://www.geologyseeker.com/2022/06/mineral-exploration-principles-and.html>

2. Chernova N. I. Fundamentals of cartography and geoinformatics: tutorial / N. I. Chernova, N. V. Katakhova. - Moscow : RTU MIREA, 2021 - Part 1 - 2021. - 88 c. - Text : electronic // Lan' : electronic library system. - URL: <https://e.lanbook.com/book/182567>. - Access mode: for authorized users.

3. Chernova N. I. Fundamentals of Cartography and Geographic Information Systems : tutorial / N. I. Chernova, N. V. Katakhova. - Moscow : RTU MIREA, 2022 - Part 2. - 82 c. - Text : electronic // Lan' : electronic library system. - URL: <https://e.lanbook.com/book/239978>. - Access mode: for authorized users.

4. Deb P.K. An Introductory to Mine Hydrogeology. Springer Cham Heidelberg New York Dordrecht London, 2014. XIV, 54 p. 12 illus., 3 illus. in color. — ISBN: 978-3-319-02987-0, ISBN: 978-3-319-02988-7 (eBook), DOI 10.1007/978-3-319-02988-7 — (SpringerBriefs in Water Science and Technology). — URL: <https://sciarium.com/file/115505/>

5. Brassington R. Field Hydrogeology, 4th Edition. — John Wiley & Sons Ltd, 2017. — 304 p. — (The Geological Field Guide Series) — ISBN: 9781118397367. — URL: <https://sciarium.com/file/268418/>

6. Broder J. Merkel, Andrea Hasche-Berger. Uranium, Mining and Hydrogeology. Springer Berlin, Heidelberg, 2008. — 980 p. — ISBN: 3540877452. — URL: https://avxhm.se/ebooks/3540877452_hydrogeology.html

7. Marjoribanks, Roger. "Geological Methods in Mineral Exploration and Mining". Springer, 2010 r - <https://www.geokniga.org/books/22451>

8. Oliver M.A., Webster R. "Basic steps in geostatistics: The variogram and kriging". Springer, 2015 - <https://www.geokniga.org/books/31182>

9. Dyar M.D., McKillup S. "Geostatistics explained. An introductory guide for Earth scientists". Cambridge University Press, 2010 - <https://www.geokniga.org/books/23337>

10. J. Wasowski, Daniele Giordan, Piernicola Lollino. "Engineering Geology and Geological Engineering for Sustainable Use of the Earth's Resources". Springer, 2017 - <http://dx.doi.org/10.1007/978-3-319-61648-3>

1. Paola Gattinoni, Enrico Maria Pizzarotti, Laura Scesi. "Engineering Geology for Underground Works". Springer Dordrecht, 2014 - <https://doi.org/10.1007/978-94-007-7850-4>

12. Hustrulid W., Kuchta M., Martin R. "Open pit mine planning and design". CRC Press, 2013 - <https://www.geokniga.org/books/28414>

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 sources:

1. Electronic libraries (EL) of RUDN University and other institutions, to which university students have access on the basis of concluded agreements:

- RUDN Electronic Library System (RUDN ELS) <http://lib.rudn.ru/MegaPro/Web>
- EL "University Library Online" <http://www.biblioclub.ru>
- EL "Yurayt" <http://www.biblio-online.ru>
- EL "Student Consultant" www.studentlibrary.ru
- EL "Lan" <http://e.lanbook.com/>
- EL "Trinity Bridge" <http://www.trmost.ru>

2. Databases and search engines:

- electronic foundation of legal and normative-technical documentation <http://docs.cntd.ru/>
- Yandex search engine [https:// www .yandex.ru/](https://www.yandex.ru/)
- Google search engine <https://www.google.ru/>
- Scopus abstract database <http://www.elsevierscience.ru/products/scopus/>
- Geology Portal 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>

3. Additional sources:

- Mining Hydrogeology <https://www.dunnhydrogeo.com/home/mining-hydrogeology-t>

The training toolkit and guidelines for a student to do an internship, keep an internship diary and write an internship report:*

1. Safety regulations to do the internship (safety awareness briefing).
2. Guidelines for keeping an internship diary and writing an internship report.

*The training toolkit and guidelines for the internship are placed on the internship page in the university telecommunication training and information system under the set procedure.

8. ASSESSMENT TOOLKIT AND GRADING SYSTEM* FOR EVALUATION OF STUDENTS' COMPETENCES LEVEL AS INTERNSHIP RESULTS

The assessment toolkit and the grading system* to evaluate the level of competences (competences in part) formation as the internship results are specified in the Appendix to the internship syllabus.

* The assessment toolkit and the grading system are formed on the basis of the requirements of the relevant local normative act of RUDN University (regulations / order).

DEVELOPERS:

**Head of the Department of
Subsoil Use and Oil&Gas
Engineering**

position, educational department

**Associate Professor of the
Department of Subsoil Use and
Oil&Gas Engineering**

position, educational department

A. Kotelnikov

name and surname

M. Romero

name and surname

HEAD OF EDUCATIONAL DEPARTMENT:

**Department of Subsoil Use and
Oil&Gas Engineering**

educational department

A. Kotelnikov

name and surname

HEAD OF HIGHER EDUCATION PROGRAMME:

**Head of the Department of
Subsoil Use and Oil&Gas
Engineering**

position, educational department

A. Kotelnikov

name and surname