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Информация о владельце:
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Должность: Ректор
Дата подписания: 02.06.2023 17:25:51
Уникальный программный ключ:
ca953a0120d891083f939673078ef1a989dae18a

**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)

FINAL STATE EXAMINATION SYLLABUS

Recommended by the Didactic Council for the Education Field of:

05.04.01 Geology

(code and name of the Higher Education Field)

**The final state examination is implemented within the professional education program
of higher education:**

Mining Geology

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

1. FINAL STATE EXAMINATION AIM AND TASKS

The aim of the Final State Examination within the framework of the program "Mining Geology / Mining Geology" is to determine the compliance of the results of students' learning the program of study with the relevant requirements of the RUDN University Educational Standards.

The tasks of the Final State Examination include the following:

- checking the quality of teaching a person basic humanitarian knowledge, natural science laws and phenomena necessary for professional activities of a graduate;
- identifying the level of theoretical and practical readiness of a graduate to perform professional tasks in compliance with the qualification obtained;
- establishing the degree of a person's desire for self-development, improving his or her qualifications and skills;
- exploring the formation of a graduate's sustainable motivation for professional activities in compliance with the types of tasks of professional activities provided for by the Federal State Educational Standard of the Higher Education or the RUDN University Educational Standards;
- assessing the level of graduates' ability to find organizational and managerial solutions in non-standard situations and evaluating graduates' readiness to bear responsibility for them;
- ensuring the integration of education and scientific and technical activities, increasing the efficiency of scientific and technological achievements use, reforming the scientific sphere and stimulating innovation;
- ensuring the quality of specialists' training in compliance with the requirements of the Federal State Educational Standards of the Higher Education or the RUDN University Educational Standards.

2. REQUIREMENTS FOR HIGHER EDUCATION PROGRAMME COMPLETION AND LEARNING OUTCOMES

A student who does not have failed pass/fail grading or exams and who has fully completed the curriculum or the individual curriculum of the higher education programme is allowed to the Final State Examination.

On the higher education programme completion, the graduate is expected to master the following **general competences (GC)**:

Code and descriptor of the general competences
<i>Systemic and critical thinking.</i> GC-1. Able to search, critical analysis of problem situations based on a systematic approach, develop an action strategy.
<i>Project development and implementation.</i> GC-2. Able to manage a project at all stages of its life cycle.
<i>Teamwork and leadership.</i> GC-3. Able to organize and manage the work of the team, developing a team strategy to achieve the goal.
<i>Communications.</i> GC-4. Able to carry out modern communication technologies in the state language of the Russian Federation and foreign language(s) for academic and professional interaction.
<i>Intercultural interaction.</i>

Code and descriptor of the general competences
GC-5. Able to analyze and take into account the diversity of cultures in the process of intercultural interaction.
<i>Self-organization and self-development.</i> GC-6. Able to identify and implement the priorities of their own activities and ways to improve it based on self-assessment.
<i>Digital Intelligence.</i> GC-7. Capable: - search for the necessary sources of information and data, perceive, analyze, memorize and transmit information using digital means, as well as using algorithms when working with data received from various sources in order to effectively use the information received to solve problems; - evaluate information, its reliability, build logical conclusions based on incoming information and data.

- general professional competencies (GPC):

Code and descriptor of the general professional competencies
GPC-1. Capable of using the theoretical foundations of special and new sections of geological sciences to solve professional activity problems.
GPC-2. Able of independently formulating the research objectives and establishing a sequence for resolving professional problems.
GPC-3. Accomplished of totally independent generalizing the results obtained while solving professional problems and developing recommendations for their practical application.
GPC-4. Suitable of representing, protecting, and disseminating the outcomes of their professional activities.
GPC-5. Proficient of conducting critical analysis and utilizing a systematic approach in the field of digital economy.

- professional competencies (PC):

Code and descriptor of the professional competencies
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-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-3. Capable of projecting, implementing, and managing a hydrogeological study of the territory during the exploration and development of a mineral deposit.
PC-4. Capable of designing, assisting with, and supervising a geologic study of a subsoil area at various stages of development.

3. FINAL STATE EXAMINATION PROCEDURE

The final state examination can be conducted both in in-person format (students and the state examination committee are at RUDN University during the examination), and through the use of distance learning technologies (DLT) available in the RUDN Electronic Information and Educational Environment.

The procedure for in-person or DLT-facilitated Final State Examination is regulated by the relevant local normative act of the RUDN University.

The final state examination within the framework of the Higher Education Programme includes defense of the Graduate Qualification Work (Degree Thesis).

4. REQUIREMENTS FOR THE GRADUATE QUALIFICATION WORK AND PROCEDURE FOR ITS DEFENSE

The Graduate Qualification Work (GQW) is a work done by a student (several students together), demonstrating the level of preparation of a graduate for independent professional activity.

The list of topics for graduation qualification works proposed to students is approved by the order of the Director of the Academy of Engineering who implements the HEP HE, and is brought to the attention of the graduate students by the program director no later than 6 months before the date of start of the GQW.

The preparation and defense of the thesis on a topic proposed by the student(s) is allowed in accordance with the established procedure.

Only a fully completed GQW, which has been signed by the graduate(s), who completed it, by the supervisor, the advisor (if any), the heads of the issuing educational department and educational division, and which has passed the external review procedure (mandatory for master's programs) and the check for the amount of borrowing (in the "Antiplagiat" system). It is mandatory to enclose to the GQW, admitted to the defense, a review of the supervisor on the work of the graduate during the preparation of the GQW.

In order to identify and timely eliminate shortcomings in the structure, content and design of the GQW, a rehearsal of the defense by students of their work (pre-defense) is held, no later than 14 days before the date of the defense, in the presence of the head of the GQW and other teachers of the graduating educational department.

The defense of the GQW is held at an open meeting of the State Examination Commission (SEC).

The certification test is carried out in the form of an oral report of students with a mandatory multimedia (graphic) presentation, reflecting the main content of the GQW.

At the end of the report, the defenders give oral answers to questions that have arisen from the members of the SEC on the subject, structure, content or design of the GQW and the profile of the HEP HE. The report and / or answers to the questions of the SEC members may be in a foreign language.

The stages of the GQW implementation, the requirements for the structure, volume, content and design, as well as the list of mandatory and recommended documents submitted for defense are indicated in the relevant guidelines.

The evaluation of the results of the GQW defense is carried out in accordance with the methodology set out in the evaluation materials presented in the Appendix to this Final State Examination program.

5. MATERIAL AND TECHNICAL SUPPORT OF THE FINAL STATE EXAMINATION

To prepare for the state exam and the defense of the GQW, students use the premises for independent work.

To conduct the test part of the state exam, a classroom is required, equipped with workplaces with personal computers (at least 12), equipped with the necessary software and connected to the Internet.

To conduct the main part of the state exam and/or defense of the GQW, a classroom with a capacity of 12 or more people is needed, in which workplaces are equipped for all members of the SEC, with the ability to listen to reports, view public presentations of speakers, keep records and protocols; there are places for listeners wishing to attend the GQW defense procedure. The required premise equipment includes:

- equipment for public presentations of GQW results, including a multimedia screen, projector, audio equipment.
- a board for illustrating answers to questions;
- tablets/stands of not less than A1 format (if necessary) to place the graphic part of the GQW on them.

The student can notify the issuing department in writing about the needs for additional material and technical equipment (if necessary) in the audience assigned to defend the GQW, no later than a week before the defense procedure.

6. EDUCATIONAL AND INFORMATION SUPPORT OF THE FINAL STATE EXAMINATION

Main literature for the implementation and defense of the GQW:

1. 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>

2. 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>

3. 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>

4. Deb P.K. An Introduction 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/>

Additional literature for the implementation and defense of the GQW:

1. Geology=Geology : a course of lectures in English : [16+] / author-compiler. E. Yu. Tumanova ; North Caucasian Federal University, S. N. Abdullaeva. - Stavropol : North Caucasian Federal University (NCFU), 2018. - 121 c. : ill., schemes. - Access mode: by subscription. - URL: <https://biblioclub.ru/index.php?page=book&id=562874>. - Bibliogr. in kn. - Text : electronic.

2. Ridley J. Ore Deposit Geology. Cambridge University Press. 2013. – 411 p. – ISBN: 978-1-107-02222-5. — URL: <https://sciarium.com/file/232589/>
3. John Milsom, Asger Eriksen. Field Geophysics, 4th edn. — John Wiley & Sons, Ltd., 2011. — ISBN: 978-0-470-74984-5. — 297 p. — URL: <https://www.geologyseeker.com/2022/06/field-geophysics-fourth-edition-by-john.html>
[http://nozdr.ru/data/media/biblio/kolxoz/P/PGp/Milsom%20J.J.,%20Eriksen%20A.%20Field%20Geophysics%20\(4ed.,%20Wiley,%202011\)\(ISBN%200470749849\)\(O\)\(297s\)_PGp_.pdf](http://nozdr.ru/data/media/biblio/kolxoz/P/PGp/Milsom%20J.J.,%20Eriksen%20A.%20Field%20Geophysics%20(4ed.,%20Wiley,%202011)(ISBN%200470749849)(O)(297s)_PGp_.pdf)
4. Charles J. Moon, Michael K. G. Whateley, Anthony M. Evans. Introduction to Mineral Exploration, 2nd Edition. — Blackwell Publishing, 2006. — 499 p. — URL: <https://www.geologyseeker.com/2022/07/introduction-to-mineral-exploration-2nd.html>
5. Rossi M.E., Deutsch C.V. Mineral Resource Estimation. Springer, 2014. — 337 p. — ISBN: 9781402057168. — URL: <https://www.geologyseeker.com/2022/05/ore-deposit-geology-by-john-ridley.html>
6. 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/>
7. Chernova N. I. Fundamentals of cartography and geoinformatics: tutorial / N. I. Chernova, N. V. Katakova. - 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.
8. Chernova N. I. Fundamentals of Cartography and Geographic Information Systems: tutorial / N. I. Chernova, N. V. Katakova. - Moscow : RTU MIREA, 2022 - Part 2 - 2022. - 82 c. - Text : electronic // Lan' : electronic library system. - URL: <https://e.lanbook.com/book/239978>. - Access mode: for authorized users.
9. 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

Resources of the information and telecommunications network "Internet":

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>
 - Geological Portal “GeoKniga” <https://www.geokniga.org>
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/>
 - 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. Other resources:

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

*Learning toolkits for self- studies of students in preparation for the GQW and in preparation for the defense of the Work *:*

1. Guidelines for the implementation and execution of the GQW in accordance with the HEP HE " Mining Geology".

2. The procedure for checking the GQW on the matter of the amount of borrowing in the "Antiplagiat" system.

3. The procedure for conducting the SFC in accordance with the HEP HE "Mining Geology" using DLT, incl. graduate identification procedure.

* - 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!

7. EVALUATION MATERIALS AND SCORE-RATING SYSTEM FOR ASSESSING THE LEVEL OF FORMATION OF COMPETENCIES OF GRADUATES

Assessment and Evaluation Toolkit (AET), Grading System (GS)* for assessing the level of competence for the Graduate Qualification Work are presented in the Appendix to the Course Syllabus of the program of Graduate Qualification Work.

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

HEAD OF THE DEPARTMENT:

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

Name of Department



Signature

A. Kotelnikov

Full name

HEAD OF HEP HE:

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

Position, Department



Signature

A. Kotelnikov

Full name