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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**

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

**FINAL STATE EXAMINATION SYLLABUS**

**Recommended by the Didactic Council for the Education Field of:**

**05.04.01 Geology**

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field of studies / speciality code and title

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

**Mining Geology**

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higher education programme profile/specialisation title

## 1. FINAL STATE EXAMINATION GOAL AND TASKS

**The goal** of the final state examination within the framework of the higher education programme implementation is to check the conformity of the students' training outcomes as the programme results with the relevant requirements of the Federal State Educational Standard of the Higher Education or 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 tests 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 critically analyze problem situations on the basis of a systematic approach, develop a strategy of action.
<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.

<b>Code and descriptor of the general competences</b>
<i>Intercultural interaction.</i> 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: - of searching 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; - of evaluating information, its reliability, build logical conclusions based on incoming information and data.

**- general professional competencies (GPC):**

<b>Code and descriptor of the general professional competencies</b>
GPC-1. Capable of using the theoretical foundations of special and new sections of geological sciences to solve professional activity problems.
GPC-2. Able to 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):**

<b>Code and descriptor of the professional competencies</b>
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 defence of the graduation qualifying paper (degree thesis).

#### **4. STATE EXAM PROCEDURE**

The state exam procedure is not included in the final state examination.

#### **5. REQUIREMENTS FOR GRADUATION QUALIFYING PAPER (DEGREE THESIS) AND PROCEDURE FOR ITS DEFENCE**

The degree thesis is a graduation qualifying paper that the student (several students in a team) prepare to demonstrate his/her/their level of competence and work readiness.

The list of degree thesis themes offered to students for further work is approved by the order of the head of the educational division (faculty/institute/academy) that runs the higher education programme, the respective information is delivered to the students by the programme head no later than six months before the date of the final state examination start.

The students are allowed to suggest their own themes for the theses, under the set procedure.

The student (students) is/are allowed to defend his/ her/their thesis only if this fully completed degree paper is signed by the respective graduate (s), the supervisor, the consultant (if any), the heads of the educational department and educational division; the thesis is also subject to the external review procedure (mandatory for master's and specialist's programmes) and the plagiarism check (in the "Anti-plagiarism" system). The review of the graduation qualifying paper supervisor shall be attached as well, with a specific emphasis laid on the graduate's activities in the course of the degree thesis drafting.

No later than 14 days before the date of the thesis defence, a rehearsal of the procedure is held at the presence of the degree thesis supervisor and other academic staff of the educational department, in order to timely identify and eliminate shortcomings in the structure, content and design of the degree thesis.

The degree theses are introduced to the State Examination Board members at the public defence procedure. It includes the students' oral reports with mandatory multimedia (graphic) presentations that introduce the thesis main content.

At the end of the reports, the students reply orally to the State Examination Board members' questions regarding the subject, structure, content of the paper and the profile/specialisation of the higher education programme. The reports and / or answers to the Board members' questions may be delivered in a foreign language.

The stages of the graduation qualifying paper preparation, the requirements for its structure, volume, contents and design, as well as the list of mandatory and recommended documents submitted for defence are specified in the relevant guidelines.

The evaluation of the degree thesis defense results is carried out in accordance with the methodology set forth in the assessment toolkit that is specified in the Appendix to the syllabus.

## 6. REQUIREMENTS FOR EQUIPMENT AND TECHNOLOGY SUPPORT FOR FINAL STATE EXAMINATION

To prepare for the defense of the degree thesis, students use the premises for independent work.

To conduct the defense of the degree thesis, a classroom with a capacity of 12 or more people is needed, in which workplaces are equipped for all members of the State Examination Commission, 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 degree thesis defense procedure. The required premise equipment includes:

- equipment for public presentations of degree thesis 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 degree thesis 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 degree thesis, no later than a week before the defense procedure.

## 7. RESOURCES RECOMMENDED FOR FINAL STATE EXAMINATION

*Main readings to prepare for the degree thesis defence:*

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 readings to prepare for the degree thesis defence:*

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 p. : 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 p. - 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 p. - 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](https://avxhm.se/ebooks/3540877452_hydrogeology.html)

*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](http://www.studentlibrary.ru)
  - EL "Lan" <http://e.lanbook.com/>
  - EL "Trinity Bridge" <http://www.trmost.ru>
  - Geological Portal "GeoKniga" <https://www.geokniga.org>
2. Databases and search engines:
  - electronic foundation 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/>

- 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>

*The training toolkit and guidelines for student's self-studies to prepare for the state exam and /or to draft the degree thesis and defend it\*:*

1. The guidelines for drafting and formatting the degree thesis within the higher education programme "Mining Geology".
2. The procedure for the degree thesis check in the "Anti plagiarism" system.
3. The procedure for conducting the final state examination under the higher education programme "Mining Geology" through the use of DLT and proctoring system.

\* The training toolkit and guidelines for the student's self-studies are placed on the final state examination page in the university telecommunication training and information system under the set procedure.

## **8. ASSESSMENT TOOLKIT AND GRADING SYSTEM\* FOR EVALUATION OF GRADUATES' COMPETENCES LEVEL**

The assessment materials and the grading system\* to evaluate the graduate's level of competences (competences in part) formation as the results of the higher education programme completion are specified in the Appendix to this syllabus.

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

### **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, department

**A. Kotelnikov**  
\_\_\_\_\_  
name and surname