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

**ENGINEERING ACADEMY**

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

**COURSE SYLLABUS**

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Geology, prospecting, and exploration of solid minerals, minerageny

(course title)

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

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1.6.10. Geology, prospecting, and exploration of solid minerals, minerageny

(field of studies / speciality code and title)

**The course instruction is implemented within the professional education programme of higher education:**

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Geology, prospecting, and exploration of solid minerals, minerageny

(higher education programme profile/specialisation title)

## 1. PURPOSE OF THE DISCIPLINE

The purpose of mastering the discipline "Geology, prospecting, and exploration of solid minerals, minerageny." is to prepare for surrender candidate exams, and same the acquisition of knowledge, skills and experience in the research field, characterizing the stages of the formation of competencies and ensuring the achievement of the planned results of the development of the educational program.

The main objectives of the discipline are:

- deep understanding of the current state of science in the field of geology of mineral resources and their prospecting and exploration;
- acquiring knowledge of modern theories and ways of development of various scientific directions in the geology of mineral resources and their prospecting and exploration;
- gaining skills of analyzing extensive and diverse geological information and skills of its systematization for decision making in prospecting and exploration of mineral resources.

## 2. REQUIREMENTS FOR THE RESULTS OF THE DISCIPLINE

Mastering the discipline " Geology, prospecting, and exploration of solid minerals, minerageny " is aimed at preparing for the candidate's examinations, as well as mastering the following competencies:

### **Know:**

- basic criteria and signs of location of mineral resources in the Earth's crust and methods of their prospecting and exploration;
- the methodology of carrying out and geological and economic evaluation of exploration objects at different stages and in different natural conditions of any type of solid minerals;
- the requirements of the industry to the quality of mineral raw materials by type of minerals and grouping of deposits by industrial type;

### **Be able to:**

- formulate goals and objectives of prospecting, exploration and research work for various geological objects;
- on the basis of various methods (mineralogical, geological, geophysical and geochemical, etc.) to forecast and assess the prospects of industrial development of mineral deposits;
- identify promising areas and sites for prospecting and evaluation of various types of minerals;
- organize rational geological exploration work as part of a team;
- conduct geological and economic evaluation of deposits, using methods of mathematical modeling;
- prepare design and estimate documentation for exploration work;
- choose a scheme of opening and preparation of a deposit for development.

### **Master**

- the methods of system analysis of geological materials;
- methods of summarizing and processing information using computer technology;
- skills of complex geological-genetic, prognostic, and geological-industrial models of mineral deposits of various types and choose rational methods of solving exploration and prospecting tasks.

## 3. SCOPE OF THE DISCIPLINE AND TYPES OF STUDY

The total workload of the discipline " Geology, prospecting, and exploration of solid minerals, minerageny." is 3 credits.

Type of study	TOTAL, ac. h.	Course
		2
<i>Contact work, ac.h.</i>	60	60
including:		
Lectures (LC)	30	30
Practical/seminar classes (SP)	30	30

Type of study		TOTAL, ac. h.	Course 2
<i>Independent work of students, ac.h.</i>		48	48
<i>Control (credit with grading), ac.h.</i>		36	36
<b>Total time commitment of the discipline</b>	ac.h.	<b>108</b>	<b>108</b>
	credits	<b>3</b>	<b>3</b>

#### 4. CONTENT OF THE DISCIPLINE

Name of discipline section	Section (topic) content	Type of study
Section 1: General information about the discipline. Search criteria and indicators.	<p>Topic 1.1. The main goals and objectives of the discipline. History of the development of science of search and exploration of mineral deposits.</p> <p>Topic 1.2. Geological and industrial classification of mineral resources.</p> <p>Topic 1.3 Stages of geological prospecting.</p> <p>Topic 1.4 Searching geological criteria (prerequisites) and indicators.</p>	LC, SP
Section 2: Prospecting for mineral deposits. Forecasting and evaluation of ore occurrences.	<p>Topic 2.1. Classification of searches according to the conditions and methods of work.</p> <p>Topic 2.2. Mineralogical, geochemical and geophysical prospecting methods.</p> <p>Searching for hidden deposits.</p> <p>Theme 2.3 Principles of predicting and evaluating mineral deposits. Methods of geological prospecting and deposit evaluation.</p> <p>Theme 2.4. Evaluation and tracing of mineral resource outcrops.</p> <p>Theme 2.5. Technical means of revealing ore bodies</p>	LC, SP
Section 3. Sampling of solid minerals	<p>Topic 3.1. The choice of sampling method; types of sampling by purpose and sampling conditions.</p> <p>Topic 3.2. Sample processing. Testing of samples.</p> <p>Theme 3. 3 Controlling the sampling process.</p>	LC, SP
Section 4. General issues of exploration of mineral deposits. Technical means and systems of exploration.	<p>Topic 4.1 Main tasks, principles and methods of exploration.</p> <p>Topic 4.2. Exploration process stages.</p> <p>Topic 4.3. Exploration networks and their density. Documentation.</p> <p>Topic 4.4. Geological and economic characteristics of the field.</p> <p>Topic 4.5. Classifying reserves of solid mineral deposits.</p> <p>Topic 4.6. Main exploration systems and technical facilities.</p>	LC, SP
Section 5. Ore reserve calculation of mineral reserves. Features of the exploration of mineral deposits of different industrial-genetic types, categories and groups of	<p>Topic 5.1. Tracking and delineation of ore bodies and deposits. Blocking of reserves.</p> <p>Theme 5.2. Calculating reserves. Determining the major parameters for calculating reserves. Accuracy of reserves estimation.</p> <p>Topic 5.3. Exploration of ore deposits and non-metallic minerals.</p>	LC, SP

Name of discipline section	Section (topic) content	Type of study
complexity.	Topic 5.4. Exploration of caustobioliths.	

## 5. LOGISTICS OF THE DISCIPLINE

Type of audience	Classroom equipment	Specialised training/laboratory equipment, software and materials for the discipline (if necessary)
511 Laboratory room	Auditorium for laboratory work, individual consultations, current monitoring and interim certification, equipped with a set of specialized furniture and equipment.	Binoculars, mineralogical collection for heavy concentrate analysis
514 Lecture room	Audience for holding classes lecture type, equipped with a set of specialized furniture; board (screen) and technical means of multimedia presentation	Projector, screen, chalkboard, computer
532 Seminar room	Auditorium for seminars, group and individual consultations, current monitoring and interim certification, equipped with a set of specialized furniture and technical means of multimedia presentations.	Scales, sieves, magnets and other equipment for mineralogical and heavy concentrate analysis
512 Computer room	Computer room for classes, group and individual consultations, current monitoring and interim certification, equipped with personal computers (10 pcs.), blackboard (screen) and technical means of multimedia presentations.	MS Office, Micromine, ArcGis, QGIS software
532, 511 For independent work of students	An auditorium for students' independent work (can be used for seminars and consultations), equipped with a set of specialised furniture and computers with access to the EIOS.	collection of rock samples, geological maps and sections

## 6. TRAINING, METHODOLOGICAL AND INFORMATION SUPPORT FOR THE DISCIPLINE

### *Basic literature:*

1. Korobeinikov A. F. Geology. Prognostication and search for mineral deposits: textbook for undergraduate and graduate studies / A. F. Korobeinikov. - 2nd ed. amended and supplemented - Moscow: Publishing house Yurait, 2019. - 254 c. - (Series : Universities of Russia). - ISBN 978-5-534-00747-3. - Text: electronic// EBS Yurite [website]. - URL: <https://biblio-online.ru/bcode/433940>
2. Porotov G.S. "Mathematical Methods of Modeling in Geology", St. Petersburg, 2006.
3. Kreiter V.M. Search and Exploration of Mineral Deposits, Part 2, M. Gosgeoltekhizdat, 1961.
4. Biryukov V.I., Kulichikhin S.N., Trofimov N.N., Search and Exploration of mineral deposits, M., Nedra, 1979.
5. Porotov G.S. Exploration and geological and economic evaluation of mineral deposits, St. Petersburg, GGI (TU), 2004, textbook.
6. Kaputin Yu.E. Mining computer technology and geostatistics. SPb: Nedra, 2002. - 424 c.
7. Milutin A. G. Exploration and geological and economic evaluation of mineral deposits. Electronic edition. MOSCOW STATE UNIVERSITY. 74 c. 2004.

8. Pogrebitsky E.O., Paradeev SV, Porotov G.S. et al, Search and Exploration of Mineral Deposits, Moscow, 1977.
9. V.V. Ershov, I.V. Eremin, G.B. Popova, E.M. Tikhomirov. Geology and Exploration of Mineral Deposits: Textbook for Universities / Ed. Ershov. -M.: Nedra, 1989.
10. N.N. Trofimov, A.I. Rychkov Geochemical Search for Ore Deposits, Moscow, PAIMS, 1998.
11. GKZ Methodological Recommendations on Application of Classification of Reserves of Deposits and Inferred Resources of Hard Mineral Reserves. Developed by the Federal State Institution "State Commission on Mineral Reserves" (FSI GKZ) by order of the Ministry of Natural Resources of the Russian Federation and at the expense of the federal budget. Approved by decree of the Ministry of Natural Resources of the Russian Federation of 05.06.2008.
12. N.N.Trofimov, V.V.Dyakonov, V.E.Markov, E.V.Karelina. Training Manual for Laboratory Work on the course "Prospecting and Exploration of Mineral Deposits Section Geological and Mineralogical Prospecting Methods. Moscow, Publishing house of the PFUR, 2009.
13. V. Dyakonov, V. Abramov, Markov, E. Karelina. Abramov, Markov, E., Karelina. training manuals for laboratory work on the course "Prognosis and Prospecting for Deposits of Mineral Resources," Section "Geophysical Methods of Prospecting. Moscow, Publishing house of PFUR, 2015.
14. N.N. Trofimov, V.V. Diakonov. Training exercises for laboratory work on the course "Prognosis and Prospecting for Mineral Deposits" Section Testing. Moscow, PFUR, 2006 15.
15. Dyakonov V., Markov V., Karelina E. Assignments for execution of laboratory works on the course "Exploration and geological and economic evaluation of mineral deposits" section "geological documentation of prospecting workings. For students in the IV course "Applied geology" specialization: Geological Surveying, Prospecting and Exploration of Solid Mineral Deposits. M. Publishing house RUDN, 18p. 2016.

*Further reading:*

1. Kreiter V.M. Search and exploration of mineral deposits, Moscow, Nedra, 1969.
2. Barannikov A.G., Ugryumov A.N., Dvornik G.P. Laboratory Workshop with the basics of theory (Prognosis and prospecting of mineral deposits), Yekat, U LSU, 2004.
3. Shevelev VV. Exploration and geological and economic evaluation of deposits of solid minerals, Irkutsk, IrgSTU, 2004.
4. Mineral raw materials (by type of minerals), Handbook, Moscow, CJSC Geoinformmark, 1997-2003.
5. Jackie Coombs (translated by Oleg Kazakov). The Art and Science of Reserve Estimation. A practical guide for geologists and mining engineers. Perth. Coombes Capability. 2008. 231 c.
6. Snowden DV, Resource Estimation. Professional Development Courses. [www.snowdengroup.com](http://www.snowdengroup.com). pp.184. 2009
7. D. Forester, Field Geology, NY Prentice, 1951.
8. William C Peters, Exploration and mining geology, NY, John Wiley & sons, 1987.
9. Hugh E. McKinstry, Mining Geology, NY, Prentice - Hall, 1961.
10. A.L.Kovalevskii Biogeochemical exploration for mineral deposits. Wash., 1979.
11. N.N. Trofimov, A.I. Rychkov, Iodine and bromine geochemical indicators of deep ore deposits, Denver, Colorado mountain publishing house, 2004.

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

1. the RUDN electronic library system and third-party electronic libraries to which university students have access on the basis of contracts:
  - RUDN Electronic Library System - RUDN EBS <http://lib.rudn.ru/MegaPro/Web>
  - The University Library Online electronic library system <http://www.biblioclub.ru>
  - The Yurite electronic library system <http://www.biblio-online.ru>

- Student Consultant electronic library system [www.studentlibrary.ru](http://www.studentlibrary.ru)
- Lan LGS <http://e.lanbook.com/>
- Trinity Bridge

2. databases and search engines:

- electronic collection of legal and normative-technical documentation <http://docs.cntd.ru/>
- search engine Yandex <https://www.yandex.ru/>
- Google search engine <https://www.google.ru/>
- SCOPUS abstract database <http://www.elsevierscience.ru/products/scopus/>

*Teaching materials for students' independent work while mastering the discipline/module\*:*

1. Course of lectures on the discipline "Geology, prospecting, and exploration of solid minerals, minerageny".

## 7. ASSESSMENT MATERIALS AND SCORING SYSTEM FOR ASSESSING THE LEVEL OF COMPETENCE IN THE DISCIPLINE

The assessment materials and grading system for the discipline are presented in the Appendix to this Work Programme of the discipline.

**DEVELOPERS:**

**Assistant Professor of the Department of  
Subsoil Use and Oil and Gas**

Position, BD

**E.V.Karelina**

Signed

Name and surname

**THE HEAD OF THE BUP:**

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

Position, BD

**A.E. Kotelnikov**

Signed

Name and surname