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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

**COURSE SYLLABUS**

**Mining Geology**

course title

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

**05.04.01 Geology**

field of studies / speciality code and title

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

**Mining Geology**

higher education programme profile/specialisation title

## 1. COURSE GOAL(s)

The goal of the course “Mining Geology” is to acquire knowledge, skills and experience in the field of modern methods of obtaining, analyzing and managing geological data within the framework of an existing mining enterprise. Additionally, it involves characterizing the stages of competence formation and ensuring the achievement of the planned results of the educational programme.

The main objectives of the course are:

- studying geological methods and techniques for investigating rock masses and managing their state;
- acquiring skills in managing reserves and quality of extracted mineral raw materials at all stages of deposit development to enhance the efficiency and safety of mining operations;
- forming skills in planning and implementing operational exploration activities;
- studying current requirements in the area of protection and sustainable utilization of solid minerals.

## 2. REQUIREMENTS TO LEARNING OUTCOMES

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

*Table 2.1. List of competences that students acquire during the course*

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Competence formation indicators (within this course)</b>
GC-6	Able to identify and implement the priorities of their own activities and ways to improve it based on self-assessment.	GC-6.1 Controls the amount of time spent on specific activities; GC-6.2. Develops time management tools and methods for accomplishing specific tasks, projects, and goals; GC-6.3 Analyzes one's resources and their limits (personal, situational, time, etc.) to successfully complete the assigned task.
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.
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-2.1. Knows the theoretical basics of geophysical research; PC-2.2 Knows how to select the best methodology, design, implement, interpret the results of geophysical works.

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Competence formation indicators (within this course)</b>
PC-3	Capable of projecting, implementing, and managing a hydrogeological study of the territory during the exploration and development of a mineral deposit.	PC-3.1 Knows the theoretical foundations and methods of hydrogeological study of the territory at the stage of exploration and development of mineral deposits; PC-3.2 Knows how to apply methodological solutions in the design, implementation and management of hydrogeological study of the territory at the stage of exploration and development of mineral deposits; 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-4.1 Knows the theoretical basis and methods of geological study of the subsoil area at various stages of its 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. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course refers to the variable component of (B1) block of the higher educational programme curriculum.

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

*Table 3.1. The list of the higher education programme components/disciplines that contribute to the achievement of the expected learning outcomes as the course study results*

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Previous courses/modules</b>	<b>Subsequent courses/modules</b>
GC-6	Able to identify and implement the priorities of their own activities and ways to improve it based on self-assessment.		Geological and Geophysical Basics of Mineral Prospecting and Exploration; Modelling of Mineral Deposits; Introduction Practical Training; Graduate Qualification Work
GPC-1	Capable of using the theoretical foundations of special and new sections		Hydrogeology; Mining Hydrogeology; Geological and Geophysical Basics of

Competence code	Competence descriptor	Previous courses/modules	Subsequent courses/modules
	of geological sciences to solve professional activity problems.		Mineral Prospecting and Exploration; Research Work (Mining Geology). Part 1; Research Work (Geological and Geophysical Survey). Part 1; Research Work (Mining Geology). Part 2; Research Work (Geological and Geophysical Survey). Part 2; 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.		Research Work (Geological and Geophysical Survey). Part 1; Research Work (Mining Geology). Part 1; Research Work (Geological and Geophysical Survey). Part 2; Research Work (Mining Geology). Part 2; Introduction Practical Training; Pre-graduation Practical Training; Mining Hydrogeology; Modelling of Mineral Deposits; Geological and Geophysical Basics of Mineral Prospecting and Exploration; 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.		Pre-graduation Practical Training; Research Work (Mining Geology). Part 1; Research Work (Mining Geology). Part 2; Mineralogy; Applied Groundwater Modeling; Mining Hydrogeology; Groundwater Dynamics; Graduate Qualification Work
PC-4	Capable of designing, assisting with, and supervising a geologic study of a subsoil area at various stages of development.		Mining Hydrogeology; Modelling of Mineral Deposits; Geological and Geophysical Basics of Mineral Prospecting and Exploration; Research Work (Mining Geology). Part 2; Introduction Practical Training; Pre-graduation Practical Training; Research Work (Geological and

Competence code	Competence descriptor	Previous courses/modules	Subsequent courses/modules
			Geophysical Survey). Part 1; Research Work (Mining Geology). Part 1; Research Work (Geological and Geophysical Survey). Part 2; Graduate Qualification Work

#### 4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course “Mining Geology” is 5 credit units.

*Table 4.1. Types of academic activities during the periods of higher education programme mastering*

Type of academic activities	TOTAL, ac. hrs.	Semesters/ training modules
		1
<i>Contact academic hours</i>	54	54
Lectures (LC)	18	18
Lab work (LW)	-	-
Seminars (workshops/tutorials) (S)	36	36
<i>Self-studies</i>	108	108
<i>Evaluation and assessment (exam/passing/failing grade)</i>	18	18 <i>Exam</i>
<b>Course workload</b>	academic hours	<b>180</b>
	credits	<b>5</b>

#### 5. COURSE CONTENTS

*Table 5.1. Course contents and academic activities types*

Course module title	Course module contents (topics)	Academic activities types
Module 1. Fundamentals of mining geology:	1.1.subject, object, areas of application, goals and objectives of mining geology; 1.2.mining and geological objects and factors of development of mineral deposits; 1.3.volumetric and qualitative indicators of minerals; 1.4.hydrogeological indicators and factors of field development; 1.5.engineering-geological factors and indicators of field development; 1.6.purpose and principles of geological exploration; 1.7.stages of geological study of the subsoil; 1.8.compilation of geological documentation: geological maps, sections, stratigraphic columns and symbols; 1.9.methods for estimating mineral reserves.	LC, S

<b>Course module title</b>	<b>Course module contents (topics)</b>	<b>Academic activities types</b>
Module 2. Methods for obtaining and interpreting geological information:	2.1.geological materials used in the design; 2.2.reliability of geological information and methods for its evaluation; 2.3.geological support of operating mining enterprises; 2.4.geological and geophysical work at an operating mining enterprise; 2.5.hydrogeological and engineering-geological studies at existing mining enterprises 2.6.assessment of the state of the rock mass; 2.7.accounting of the state and movement of mineral reserves at mining enterprises; 2.8.calculation of reserves, losses and dilution, accounting of the state and movement of reserves; 2.9.geological support for management of reserves and quality of minerals; 2.10. management of geological data at an operating enterprise; 2.11. construction of complex resource block models.	LC, S
Module 3. International methods of reserves estimation:	3.1.modern reserves accounting codes; 3.2.JORC Code: features, scope	LC, S

\* LC - lectures; LW - lab work; S - seminars.

## **6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS**

*Table 6.1. Classroom equipment and technology support requirements*

<b>Type of academic activities</b>	<b>Classroom equipment</b>	<b>Specialised educational / laboratory equipment, software, and materials for course study (if necessary)</b>
Lecture	A lecture hall for lecture-type classes, equipped with a set of specialised furniture; board (screen) and technical means of multimedia presentations.	
Computer Lab	A classroom for conducting classes, group and individual consultations, current and mid-term assessment, equipped with personal computers, a board (screen) and technical means of multimedia presentations.	Specialized software: <ul style="list-style-type: none"> <li>• Micromine,</li> <li>• GIS GEOMIX,</li> <li>• QGIS.</li> </ul>
Seminar	A classroom for conducting seminars, group and individual consultations, current and mid-term assessment; equipped with a set of	

	specialised furniture and technical means for multimedia presentations.	
Self-studies	A classroom for independent work of students (can be used for seminars and consultations), equipped with a set of specialised furniture and computers with access to the electronic information and educational environment.	

## 7. RESOURCES RECOMMENDED FOR COURSE STUDY

### *Main reading:*

1. Marat Abzalov. "Applied Mining Geology". Springer Cham, 2016 - <https://doi.org/10.1007/978-3-319-39264-6>
2. Paul Alexandre. "Novel Methods and Applications for Mineral Exploration". Mdpi AG, 2020 - [https://www.google.ru/books/edition/Novel\\_Methods\\_and\\_Applications\\_for\\_Mineral/FsvlDwAAQBAJ?hl=ru&gbpv=1&pg=PR1&printsec=frontcover](https://www.google.ru/books/edition/Novel_Methods_and_Applications_for_Mineral/FsvlDwAAQBAJ?hl=ru&gbpv=1&pg=PR1&printsec=frontcover)
3. Lisle R.J. "Geological structures and maps. A practical guide". Elsevier, 2004 - <https://www.geokniga.org/books/23418>

### *Additional reading:*

1. G.S. Roonwal. "Mineral Exploration: Practical Application". Springer Singapore, 2017 - <https://doi.org/10.1007/978-981-10-5604-8>
2. Govind Singh Bhardwaj. "Practical Guide Book for Mining Geology". College of Technology and Engineering Udaipur, 2014 - [https://www.researchgate.net/publication/266078320\\_Practical\\_Guide\\_Book\\_for\\_Mining\\_Geology](https://www.researchgate.net/publication/266078320_Practical_Guide_Book_for_Mining_Geology)
3. Peter T. Bobrowsky, Brian Marker. "Encyclopedia of Engineering Geology". Springer Cham, 2018 - <https://doi.org/10.1007/978-3-319-73568-9>

### *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>
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/>

*Training toolkit for self- studies to master the course* \*:

1. The set of lectures on the course “Mining Geology”.

2. Guidelines for students on the development of the course “Mining Geology”.

\* The training toolkit for self- studies to master the course is placed on the course 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 UPON COURSE COMPLETION**

The assessment toolkit and the grading system\* to evaluate the competences formation level (competences in part) upon the course study completion are specified in the Appendix to the course 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:**

**Associate Professor, Geology  
and Survey Department,  
MISIS**

position, educational department

**V. Cheskidov**

name and surname

**Senior Lecturer, Geology and  
Survey Department, MISIS**

position, educational department

**A. Lipina**

name and surname

### **HEAD OF EDUCATIONAL DEPARTMENT:**

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

educational department

**A. Kotelnikov**

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### **HEAD OF**

### **HIGHER EDUCATION PROGRAMME:**

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