**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)

# COURSE SYLLABUS

Management of reserves and quality mineral raw materials
(Subject / Course title)

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

**05.04.01 Geology**
(code and name of the Higher Education Field)

**The development of the discipline is carried out within the framework of the implementation of the Higher Education Programme of Higher Education (HEP HE):**

**Mining Geology**
(name (profile/specialization) of the Higher Education Program)

**2023**

## 1. AIMS AND OBJECTIVES

The purpose of mastering the discipline "Management of reserves and quality mineral raw materials" is:

- acquiring knowledge, skills and experience in the field of strategic, medium-term and operational planning of mining operations, taking into account the requirements for the quality of mineral raw materials supplied to the primary stages, characterizing the stages of formation of competencies and ensuring the achievement of the planned results of the development of the educational programme.

The main objectives of the discipline are:

- application development and improvement of methods and means of processing geological information;
- forecasting and regulation of geological and technological parameters of mined ores in the design, planning and operational management of reserves and quality of mineral raw materials based on modern computer technologies;
- modeling of ore flows for various technologies of subsoil development.

## 2. REQUIREMENTS TO LEARNING OUTCOMES

Mastering the discipline "Management of reserves and quality mineral raw materials" is aimed at developing the following competencies (parts of competencies) among students:

*Table 2.1. The list of competencies formed by students in the course of mastering the discipline (the results of mastering the discipline)*

| Code | Competence | Competence Formation Indicators (within this discipline) |
|---|---|---|
| GC-3 | Able to organize and manage the work of the team, developing a team strategy to achieve the goal. | GC-3.1 Defines his/her role in the team based on a collaborative strategy to achieve the goal; |
| | | GC-3.2 Exchange information, knowledge, and experience with team members; |
| | | GC-3.3 Argues his/her point of view regarding the use of other team members' ideas to achieve the goal set. |

## 3. THE PLACE OF DISCIPLINE IN THE STRUCTURE OF HEP HE

Discipline "Management of reserves and quality mineral raw materials" refers to Elective Disciplines of block B1 of the HEP HE.

As part of the HEP HE, students also master other disciplines and / or practices that contribute to the achievement of the planned results of mastering the discipline "Management of reserves and quality mineral raw materials".

*Table 3.1. The list of components of the HEP HE that contribute to the achievement of the planned results of the development of the discipline*

| Code | Competence | Previous Disciplines (Modules)* | Subsequent Disciplines (Modules)* |
|---|---|---|---|
| GC-3 | Able to organize and manage the work of the | | Final state attestation |

| Code | Competence | Previous Disciplines (Modules)* | Subsequent Disciplines (Modules)* |
|---|---|---|---|
| | team, developing a team strategy to achieve the goal. | | |

* - filled in in accordance with the matrix of competencies and academic curriculum of HEP HE

## 4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

Course workload "Management of reserves and quality mineral raw materials" is 3 credit units.

*Table 4.1. Types of academic activities during the period of the HE programme mastering*

| Type of academic activities | | TOTAL, ac. hrs. | Semester 2 |
|---|---|---|---|
| *Contact academic hours* | | *51* | *51* |
| Lectures | | 17 | 17 |
| Lab work | | - | - |
| Seminars (workshops/tutorials) | | 34 | 34 |
| *Self-study (ies), academic hours* | | *57* | *57* |
| *Evaluation and assessment (exam or pass/fail grading)* | | *0* | *0 fail grading with grade* |
| **Course workload** | academic hours | **108** | **108** |
| | credits | **3** | **3** |

## 5. COURSE MODULES AND CONTENTS

*Table 5.1. Course Modules and Contents by types of academic activities*

| Modules | Topics | Type of academic activities* |
|---|---|---|
| Section 1. Introduction: | 1.1. geological aspects of ore quality management;<br>1.2. essence and specifics of ore quality management. | Lec, Sem |
| Section 2. Mathematical models and methods of geological control of ore quality: | 2.1. mathematical models used in the process of managing the quality of mineral raw materials;<br>2.2. information support for modeling redoflows;<br>2.3. geological methods of ore quality control;<br>2.4. modeling the processes of formation of ore flows and quality of ores;<br>2.5. statistical analysis;<br>2.6. ore quality control; | Lec, Sem |

| Modules | Topics | Type of academic activities* |
|---|---|---|
| | 2.7. methods for the rapid determination of the qualitative characteristics of ores;<br>2.8. designing systems for collecting data on the quality of ores, products, as well as the composition of waste from a mining enterprise;<br>2.9. metal balance: methods of construction, determination of the causes of inconsistencies. | |
| Section 3. Prediction of ore quality: | 3.1. forecasting the quality of ores in the bowels;<br>3.2. forecasting and statistical regulation of qualitative indicators;<br>3.3. geological information processing system for ore quality management;<br>3.4. prospects for the development of a system of geological support for ore quality management. | Lec, Sem |
| Section 4. Management of mineral reserves: | 4.1. establishing the right to use subsoil in various countries;<br>4.2. the sequence of involvement of subsoil plots in mining;<br>4.3. current control of the state of stocks. | Lec, Sem |

* - *Lec – Lectures; Lab – Lab work; Sem – Seminars (workshops/tutorials).*

## 6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

*Table 6.1. Classroom Equipment and Technology Support Requirements*

| Classroom for Academic Activity Type | Classroom Equipment | Specialized educational / laboratory equipment, software and materials for mastering the discipline (if necessary) |
|---|---|---|
| Lecture | Auditorium for lecture-type classes, equipped with a set of specialized furniture; blackboard (screen) and technical a set of specialized furniture, a board (screen), and technical means of multimedia presentations. | |
| Computer Lab | Computer lab for conducting classes, group and individual consultations, current control | Specialized software:<br>• MS Office licensed software package, |

| | | |
|---|---|---|
| | and intermediate attestation, equipped with personal computers (21 pcs. computer class equipped with 21 personal computers, a blackboard (screen) and multimedia devices. technical means of multimedia presentations. | • Micromine,<br>• GIS GEOMIX,<br>• QGIS. |
| Seminars | Auditorium for classes seminars, group and individual consultations, current control and intermediate attestation, equipped with a set of a set of specialized furniture and technical means of multimedia presentations. | Subject audience of the basics of geology (stationary multimedia computer 1 piece, a collection of minerals (300 samples), a collection of rocks (300 samples), a collection of minerals (200 samples), a set of demonstration equipment, a multimedia projector, a projection screen, a teaching board, a set of educational furniture for 30 seats. |
| Self-studies | Auditorium for independent work (can be used for seminars and consultations), equipped with a set of a set of specialized furniture and computers with access to the EITS of the university. | |

## 7. RECOMMENDED SOURCES FOR COURSE STUDIES

*Main reading(sources):*

1. Ayuk E.T., Pedro A.M., Ekins P. "Mineral Resource Governance in the 21st Century: Gearing extractive industries towards sustainable development". Nairobi: International Resource Panel, United Nations Envio, 2020 - https://www.resourcepanel.org/reports/mineral-resource-governance-21st-century
2. Dyar M.D., McKillup S. "Geostatistics explained. An introductory guide for Earth scientists". Cambridge University Press, 2010 - https://www.geokniga.org/books/23337
3. Oliver M.A., Webster R. "Basic steps in geostatistics: The variogram and kriging". Springer, 2015 - https://www.geokniga.org/books/31182

*Additional (optional) reading (sources):*

1. Kaan Erarslan. "Computer Aided Ore Body Modelling and Mine Valuation". Dumlupinar University, Mining Engineering Department, Kutahya, 2011 - https://www.intechopen.com/chapters/27600
2. Ashok Gupta, Denis S. Yan. "Mineral Processing Design and Operation " – Elsevier, 2016 - https://miningstudents.files.wordpress.com/2016/12/mineral_processing_design_and_operation.pdf

3. CIM Council. "CIM Estimation of Mineral Resources & Mineral Reserves Best Practice Guidelines". Canadian Institute of Mining, 2019 - https://mrmr.cim.org/media/1129/cim-mrmr-bp-guidelines_2019.pdf

*Internet-(based) sources:*

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

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/

*Learning toolkits for self- studies in the RUDN LMS TUIS *:*

1. Guidelines for students on the development of the subject "Management of reserves and quality mineral raw materials".
2. Course of lectures on the subject " Management of reserves and quality mineral raw materials".

* - 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**!

## 8. ASSESSMENT AND EVALUATION TOOLKIT AND GRADING CRITERIA

Assessment and Evaluation Toolkit (AET), Grading System (GS)* for assessing the level of competence (part of competence) for the subject "Management of reserves and quality mineral raw materials" are presented in the Appendix to the Course Syllabus of the subject.

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

**DEVELOPERS:**

| | | |
|---|---|---|
| **Associate Professor, Geology and Survey Department** | | **V. Cheskidov** |
| Position, Department | Signature | Full name |
| **Senior Lecturer, Geology and Survey Department** | | **A. Lipina** |
| Position, Department | Signature | Full name |

**HEAD of Department:**

| **Director of the Department of Subsoil Use and Oil&Gas Engineering** |  | **A. Kotelnikov** |
|---|---|---|
| Name of Department | Signature | Full name |

**HEAD OF HEP HE:**

| **Director of the Department of Subsoil Use and Oil&Gas Engineering** |  | **A. Kotelnikov** |
|---|---|---|
| Position, Department | Signature | Full name |