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ФИО: Ястребов Олег Александрович
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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

Management of Reserves and Quality Mineral Raw Materials

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 “Management of Reserves and Quality Mineral Raw Materials” is to acquire 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. 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:

- developing and enhancing methods and tools for processing geological information;
- forecasting and regulating geological and technological parameters of mined ores in the design, planning, and operational management of reserves and quality of mineral raw materials using modern computer technologies;
- modelling ore flows for various technologies of subsoil development.

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

| Competence code | Competence descriptor | Competence formation indicators (within this course) |
|------------------------|---|---|
| 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 Exchanges 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. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course refers to the elective 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

| Competence code | Competence descriptor | Previous courses/modules | Subsequent courses/modules |
|------------------------|---|---------------------------------|-----------------------------------|
| GC-3 | Able to organize and manage the work of the team, developing a team strategy to achieve the goal. | | Graduate Qualification Work |

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course “Management of Reserves and Quality Mineral Raw Materials” is 3 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 |
|---|--------------------|-----------------------------------|
| | | 2 |
| <i>Contact academic hours</i> | 51 | 51 |
| Lectures (LC) | 17 | 17 |
| Lab work (LW) | - | - |
| Seminars (workshops/tutorials) (S) | 34 | 34 |
| <i>Self-studies</i> | 57 | 57 |
| <i>Evaluation and assessment (exam/passing/failing grade)</i> | 0 | 0 <i>Failing grade</i> |
| Course workload | academic hours | 108 |
| | credits | 3 |

5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

| Course module title | Course module contents (topics) | Academic activities types |
|--|---|---------------------------|
| Module 1. Introduction: | 1.1.geological aspects of ore quality management; 1.2.essence and specifics of ore quality management. | LC, S |
| Module 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; 2.2.information support for modeling redoflows; 2.3.geological methods of ore quality control; 2.4.modeling the processes of formation of ore flows and quality of ores; 2.5.statistical analysis; 2.6.ore quality control; 2.7.methods for the rapid determination of the qualitative characteristics of ores; 2.8.designing systems for collecting data on the quality of ores, products, as well as the composition of waste from a mining enterprise; 2.9.metal balance: methods of construction, determination of the causes of inconsistencies. | LC, S |

| Course module title | Course module contents (topics) | Academic activities types |
|--|--|----------------------------------|
| Module 3. Prediction of ore quality: | 3.1.forecasting the quality of ores in the bowels; 3.2.forecasting and statistical regulation of qualitative indicators; 3.3.geological information processing system for ore quality management; 3.4.prospects for the development of a system of geological support for ore quality management. | LC, S |
| Module 4. Management of mineral reserves: | 4.1.establishing the right to use subsoil in various countries; 4.2.the sequence of involvement of subsoil plots in mining; 4.3.current control of the state of stocks. | 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

| Type of academic activities | Classroom equipment | Specialised educational / laboratory equipment, software, and materials for course study (if necessary) |
|------------------------------------|--|--|
| 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 (in the amount of 21 pcs), a board (screen) and technical means of multimedia presentations. | Specialized software: <ul style="list-style-type: none"> • Micromine, • GIS GEOMIX, • QGIS. |
| 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. 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 reading:

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 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
 - 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 “ Management of Reserves and Quality Mineral Raw Materials”.
2. Guidelines for students on the development of the course “Management of Reserves and Quality Mineral Raw Materials”.

* 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

name and surname

HEAD OF

HIGHER EDUCATION PROGRAMME:

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

position, educational department

A. Kotelnikov

name and surname