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

Innovative Remote Sensing Methods in 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

2025

1. COURSE GOAL(s)

The goal of the course “Innovative Remote Sensing Methods in Geology” is the acquisition by students of knowledge about the use of remote sensing in mineral exploration characterizing the stages of the formation of competencies and ensuring the achievement of the planned results of mastering the educational programme.

The main objectives of the course are:

- mastering modern methods of remote sensing, the methodology of complex processing of satellite images and geological and geophysical data;
- developing skills in predicting mineral deposits and studying geological processes based on remote sensing;
- becoming familiar with methods of predicting uranium mineralization using remote sensing data (using examples from mines in Canada, Namibia, Russia, and other countries).

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-1.	Able to critically analyze problem situations on the basis of a systematic approach, develop a strategy of action.	GC-1.1. Analyzes the problem, identifying its basic components;
		GC-1.2. Performs information retrieval for solving the task by various types of inquiries;
		GC-1.3. Suggests options for solving the problem, analyzes the possible consequences of their use.

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

Competence code	**Competence descriptor**	**Previous courses/modules**	**Subsequent courses/modules**
GC-1.	Able to critically analyze problem situations on the basis of a systematic approach, develop a strategy of action.	Digital Technologies in Geology; Geoinformation Systems for Geology Based on Space Imagery	Graduate Qualification Work; Information Databases

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course "Innovative Remote Sensing Methods in 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**
			3
Contact academic hours		*35*	*35*
Lectures (LC)		-	-
Lab work (LW)		-	-
Seminars (workshops/tutorials) (S)		35	35
Self-studies		*118*	*118*
Evaluation and assessment (exam/passing/failing grade)		*27*	*27 Exam*
Course workload	academic hours	**180**	**180**
	credits	**5**	**5**

5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course module title	**Course module contents (topics)**	**Academic activities types**
Module 1. Remote sensing	1.1. Fundamentals of remote sensing. Russian and foreign remote sensing-satellites. 1.2. Algorithms and levels of remote sensing data processing	S S
Module 2. Features of the application of remote sensing methods	2.1. Remote sensing for regional and large-scale mineral exploration; 2.2. Features of the application of remote sensing methods in various regions;	S S
Module 3. Practice in the use of remote sensing for solving geological issues	3.1. World experience in the use of remote sensing for the search and forecast of mineral deposits. 3.2. Structural and spectral methods for predicting mineral deposits.	S S

* - to be filled in only for **full** -time training: *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)
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.	
Computer Lab	A classroom for conducting classes, group and individual consultations, current and mid-term assessment, equipped with personal computers (in the amount of 24 pcs), a board (screen) and technical means of multimedia presentations.	Specialized software: • QGIS • ENVI • ArcGIS
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. Kats Ya.G., Tevelev A.V., Poletaev A.I. Fundamentals of space geology: textbook. Moscow: Nedra, 1988.
2. Knizhnikov Y.F. Aerospace sounding. Textbook. Moscow: Moscow State University Publisher, 1997.
3. Kronberg P. Remote Sensing of the Earth: Principles and Methods of Remote Sensing in Geology. Translated from German. - Moscow: The World, 1988.

Additional reading:

1. Vinogradov B.V. Aerospace Monitoring of Ecosystems. Moscow: Nauka, 1984.
2. Genike A.A., Pobedinsky G.G. Global satellite positioning system GPS and its application in geodesy.-M.: Cartgeocenter-Geodesizdat, 1999.
3. GLONASS: Principles of Construction and Functioning / Edited by A.I. Perov, V.N. Kharisov. Moscow: Radiotekhnika, 2005.

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. Guidelines for students on the development of the course "Innovative Remote Sensing Methods in 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:

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