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

Groundwater Dynamics
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

2026

1. COURSE GOAL(s)

The goal of the course "Groundwater Dynamics" is to acquire knowledge, skills and experience in the field of quantitative laws of groundwater movement in the Earth's crust is to acquire knowledge.

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.
GC-2.	Able to manage a project at all stages of its life cycle.	GC-2.1. Formulates a problem whose solution is directly related to the achievement of the project goal; GC-2.2 Identifies the connections between the tasks and the expected results of their solution; GC-2.3 Identifies the available resources and constraints within the assigned tasks and the applicable legal regulations.
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 Know the theoretical foundations and methods of hydrogeological study of the territory at the stage of exploration and development of mineral deposits

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.	Modelling of Mineral Deposits	Graduate Qualification Work
GC-2.	Able to manage a project at all stages of its life cycle.	*Innovative Remote Sensing Methods in Geology**; *Geoinformation Systems for Geology Based on Space Imagery**; Digital Technologies in Geology	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.	*Mineralogy;* Mining Geology	Pre-graduation Practical Training; Research Work (Mining Geology). Part 2; Graduate Qualification Work

** - elective disciplines/practices

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course "Groundwater Dynamics" is 4 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		*54*	*54*
Lectures (LC)		18	18
Lab work (LW)		-	-
Seminars (workshops/tutorials) (S)		36	36
Self-studies		*72*	*72*
Evaluation and assessment (exam/passing/failing grade)		*18*	*18 Exam*
Course workload	academic hours	**144**	**144**
	credits	**4**	**4**

55. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course module title	Course module contents (topics)	Academic activities types
Module 1. Principles of Ground-Water Flow	Topic 1.1. General Laws	LC, S
	Topic 1.2 Equations of Ground-Water Flow	LC, S
Module 2. Ground-Water Flow to Wells	Topic 2.1. Computing Drawdown Caused by a Pumping Well	LC, S
	Topic 2.2. Determining Aquifer Parameters from Time-Drawdown Data	LC, S
	Topic 2.3 Estimating Aquifer Transmissivity from Specific Capacity Data	LC, S
	Topic 2.4 Intersecting Pumping Cones and Well Interference	LC, S
	Topic 2.5 Effect of Hydrogeologic Boundaries	LC, S
	Topic 2.6 Aquifer-Test Design	LC, 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)
Lecture	A lecture hall for lecture-type classes, equipped with a set of specialised furniture; board (screen) and technical means of multimedia presentations.	
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. Fetter C.W. Applied hydrogeology. Waveland Press, 2018, 621 p., ISBN: 1-4786-3709-9 https://www.geokniga.org/

2. Mazor E. Global water dynamics: Shallow and deep groundwater, petroleum hydrology, hydrothermal fluids, and landscaping. Marcel Dekker Inc, 2004, 403 p. https://www.geokniga.org/

3. Hiscock K.M. Hydrogeology. Principles and practice. Blackwell science Ltd, 2005, 404 p., ISBN: 0-632-05763-7 https://www.geokniga.org/

Additional reading:

1. Sanderson D.J., Zhang X. Numerical modelling and analysis of fluid flow and deformation of fractured rock masses. Elsevier, 2002, 300 p., ISBN: 0-08-043931-4 https://www.geokniga.org/

2. Kirsch R. Groundwater geophysics. A tool for hydrogeology. Springer, 2006, 499 p., ISBN: 978-3-540-29383-5 https://www.geokniga.org/

3. Kovalevsky V.S., Kruseman G.P., Rushton K.R. Groundwater studies. Paris, 2004, 430 p., ISBN: 92-9220-005-4. https://www.geokniga.org/

4. Bloetscher F. Manual of water supply practices. Groundwater. American Water Works Association, 2014, 295 p., ISBN: 978-1-58321-964-5. https://www.geokniga.org/

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 “Groundwater Dynamics”.
2. Guidelines for students on the development of the course “Groundwater Dynamics”.

* 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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