Federal State Autonomous Educational Institution of 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

Modern aspects of geological and geophysical research in the oil and gas industry / Современные аспекты геолого-промысловых и геофизических исследований в нефтегазовом деле

course title

Recommended by the Didactic Council for the Education Field of:

21.04.01 Oil and Gas Engineering

field of studies / speciality code and title

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

Oil and Gas Engineering / Технологии добычи и транспортировки нефти и газа

higher education programme profile/specialisation title

2026

1. COURSE GOAL(s)

The discipline «Modern aspects of geological and geophysical research in the oil and gas industry / Современные аспекты геолого-промысловых и геофизических исследований в нефтегазовом деле» is included in the curriculum of the master's programme "Oil and Gas Engineering / Технологии добычи и транспортировки нефти и газа" within the field of study 21.04.01 "Oil and Gas Engineering" and is studied in the 1-2 semesters of master 1. The discipline is delivered by the Department of Mineral Developing and Oil & Gas Engineering. It consists of 9 sections and 29 topics and is aimed at studying the worldwide experience in the development of oil and gas fields, studying the main geological processes of reservoir formation that determine the structural features of oil and gas deposits, studying methods of well and laboratory studies of reservoir properties, studying methods for studying well conditions, methods for optimizing their operation and methods of reservoir stimulation to enhance oil recovery of reservoirs, as well as monitoring the development of oil and gas fields.

The goal of the discipline is to obtain knowledge, skills, abilities and experience in the field of modern methods of studying the geological structure of oil and gas deposits through the use of both geological, field and geophysical methods, as well as analysis of porosity, permeability and mechanical properties of rock samples in laboratory conditions for further design and optimization of oil and gas field development.

2. REQUIREMENTS FOR LEARNING OUTCOMES

The course "Modern aspects of geological and geophysical research in the oil and gas industry / Современные аспекты геолого-промысловых и геофизических исследований в нефтегазовом деле" is designed for students to acquire 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-7	Able to: search for the necessary sources of information and data, perceive, analyze, memorize and transmit information using digital means, as well as algorithms when working with data received from various sources in order to effectively use the information received to solve problems; evaluate information, its reliability, build logical conclusions based on incoming information and data	GC-7.1. Knows the technologies for collecting, processing, analyzing and interpreting information in digital environments; rights and obligations governing relations between people, social communities, organizations.
		GC-7.2. Can assess the risks and threats associated with the use of information and communication technologies in their professional activities, knows how to level them with available means; apply and adapt known methods and technologies of working with information to new tasks due to changing socio-economic conditions; find and analyze relevant legal and economic information sufficient to make informed decisions; apply legal knowledge in the analysis of conflict situations.

Competence code	Competence descriptor	Competence formation indicators (within this course)
		GC-7.3. Has the information technologies of communication, search, processing and storage of information; the skills to prevent negative legal and economic consequences of their own actions or inactions.
GPC-1	Able to solve production and/or research tasks based on fundamental knowledge in the oil and gas field	GPC-1.1. Knows the methods and technologies (including innovative ones) of development in the field of Oil and Gas Engineering, scientific and methodological support of professional activity, principles of professional ethics.
		GPC-1.2. Can carry out research activities for the development and implementation of innovative technologies in the field of Oil and Gas Engineering; develop programs for monitoring and evaluating the results of the implementation of professional activities; develop information and methodological materials in the field of professional activity; use the fundamental knowledge of professional activity to overcome specific challenges of oil and gas production.
		GPC-1.3. Has the skills of physical and software modeling of separate fragments of the process of choosing the best option for specific conditions; skills in analyzing the causes for the quality reduction of technological processes and suggests effective methods to improve the quality of work in various technological operations; the skills in the use of modern tools and methods for planning and controlling projects related to the complications arising in the course of work.
PC-2	Able to develop and implement new advanced technologies in the field of geological exploration, evaluation and estimation of hydrocarbon raw materials	PC-2.1. Knows the methodological provisions, instructions and requirements for the geological study of the subsoil and geological exploration; the reserve estimation management policy; rules for compiling documentation in the field of reserves estimation and management; technologies for conducting, processing and interpreting geological and geophysical works; exploration technologies; national and global trends in the development of advanced technologies.

Competence code	Competence descriptor	Competence formation indicators (within this course)
		PC-2.2. Can manage the production activities of the entrusted structural unit; check the design documentation for compliance with the requirements of existing norms and rules; introduce advanced technologies in the process of prospecting and exploration of oil and gas fields; develop proposals and take prompt measures aimed at improving the quality of activities work.
		PC-2.3. Has the skills for studying Russian and foreign experience in matters of assessing and managing reserves; skills for preparing proposals for new methods and technologies in the field of geological exploration and reserve estimation; the skills for supervising the execution of case studies and research and development activities.
PC-4	Able to draw up technical documentation for the implementation of the technological process (work schedules, instructions, plans, estimates, requests for materials, equipment, etc.), make an economic assessment of oil and gas fields in accordance with approved forms	PC-4.1. Knows the requirements and GOSTs for the preparation of technical documentation, basic methods of geological and industrial assessment of oil and gas fields; methods of geological-industrial and geological-economic assessment (GEO) of new geological exploration projects, taking into account all the uncertainties and risks of their implementation.
		PC-4.2. Can draw up and draw up technical documentation for the implementation of technological processes in the field of oil and gas field development, transportation and processing of oil and oil products; apply new methods of geological and industrial evaluation of oil and gas fields; determine the geological resources and the probability of finding a deposit, its production potential; carry out planning and evaluation of infrastructure solutions; determination of costs for the discovery and development of a field.
		PC-4.3. Has the methodology for preparing primary reporting, including work schedules, instructions, plans, estimates, applications for materials, equipment according to approved forms.
PC-6	Able to organize, manage, and carry out quality control of the main types of work in the development of oil	PC-6.1. Knows: The main types of applied systems for assessing the quality of geological types of work in the development

Competence code	Competence descriptor	Competence formation indicators (within this course)
	and gas fields, transportation and processing of oil and gas	of oil and gas fields, transportation and processing of oil and gas; ISO-9001 quality system, GKZ regulations and classification of oil and gas reserves; Requirements of regulatory legal acts of the Russian Federation, local regulations, administrative documents and technical documentation in the field of hydrocarbon production; Technological processes of hydrocarbon production; Purpose, device and principle of operation of equipment for the extraction of hydrocarbon raw materials; Physical and chemical properties of hydrocarbon raw materials, chemical reagents, the procedure and rules for their disposal; Technological modes, well operation parameters; Standards for technological losses of hydrocarbon raw materials during production in accordance with the accepted scheme and development technology; The influence of various processes occurring in the reservoir on the productivity factor of a production well; The procedure for measuring the productivity factor of a production well; Methods for calculating the productivity factor and skin effect according to well surveys with recording the pressure recovery curve; Purpose, device and principle of operation of equipment for mechanized production of hydrocarbon raw materials; Standards, specifications, guidelines for the development and execution of technical documentation; Types of emergencies during well operation, their causes and methods of prevention and elimination; Structure, interaction of means of an automated process control system, telemechanics, automatic control systems for hydrocarbon production equipment, ways to control them; Requirements for labor protection, industrial, fire and environmental safety.
		PC-6.2. Can: Organize and conduct quality control of work in the development of oil and gas fields, transportation and processing of oil and gas at different stages of the study of specific objects; Evaluate the residual life of hydrocarbon production equipment; Analyze inflow characteristics in a vertical, horizontal or multilateral well; Predict the change in the inflow characteristics from the reservoir to the well, taking into account the

Competence code	Competence descriptor	Competence formation indicators (within this course)
		reservoir operation mode; Develop operating instructions for hydrocarbon production equipment; Control the operation of equipment for artificial lift of hydrocarbons; Identify wells operating with deviations from the planned regime; Conduct emergency drills with subordinate personnel according to the action plan for localization and elimination of accidents and incidents at hydrocarbon production facilities.
		PC-6.3. Has: The methodology for assessing the quality of all types of work in the development of oil and gas fields, transportation and processing of oil and gas at different stages of the study of specific objects; Skills for organizing and monitoring the implementation of plans and tasks for the extraction of hydrocarbons; Skills for operational management of production and monitoring compliance with hydrocarbon production technology; Skills for monitoring compliance with the specified operating mode of well equipment, piping, oil and gas field pipelines, prefabricated pipelines, gas pipelines, pipelines, inhibitor pipelines in accordance with the requirements of the technological regulations of the installation, operating instructions and passports of equipment manufacturers; Skills to analyze the dynamics of hydrocarbon production; Organization of providing jobs with up-to-date technological documentation; Skills in organizing monitoring and control of the operation of the field and wells; Skills of control and management of work on the preparation and maintenance of technical documentation of the unit; Skills of control and management in the direction of compliance with the requirements of labor protection, industrial, fire and environmental safety in the unit; Skills to control and manage the preparation of reports on the production of hydrocarbons.

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

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

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-7	Able to: search for the necessary sources of information and data, perceive, analyze, memorize and transmit information using digital means, as well as algorithms when working with data received from various sources in order to effectively use the information received to solve problems; evaluate information, its reliability, build logical conclusions based on incoming information and data		Information technologies in the oil and gas industry; Final State Examination
PC-3	Able to manage the system for monitoring the technical condition and technical diagnostics at the facilities and plants of the oil and gas complex		Current development of the production of unconventional hydrocarbon resources in the world; Research Work (Obtaining Primary Skills in Research Work); Final State Examination
PC-5	Capable of applying the basic principles of rational use of natural resources and environmental protection		Research Work (Obtaining Primary Skills in Research Work); Final State Examination
GPC-1	Able to solve production and/or research tasks based on fundamental knowledge in the oil and gas field		Comprehensive analysis of processing, storage and marketing of hydrocarbons; Diagnostics of oil and petroleum products main pipeline facilities; Improving the efficiency of the production process and operation of equipment for the extraction of hydrocarbons; Innovative technologies for the development of hydrocarbon deposits; Innovative technologies for the transportation and storage of hydrocarbons; Well Repair and Water Breakthrough Control Technologies; Final State Examination
PC-7	Able to manage the work		Current development of

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
	on the diagnostic examination of the main oil pipelines (MOP) and the main oil product pipelines (MOPP) facilities		the production of unconventional hydrocarbon resources in the world; Improving the efficiency of the production process and operation of equipment for the extraction of hydrocarbons; Innovative technologies for the development of hydrocarbon deposits; Well Repair and Water Breakthrough Control Technologies; Methods for Oil Production Intensification and Enhanced Oil Recovery; Final State Examination

* To be filled in according to the competence matrix of the higher education programme

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course "Modern aspects of geological and geophysical research in the oil and gas industry / Современные аспекты геолого-промысловых и геофизических исследований в нефтегазовом деле" is 8 credits.

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

Type of study work		TOTAL, acc.hrs.	Semester(s)	
			1	**2**
Contact academic hours, acc .		*70*	*36*	*34*
including:		35	18	17
Lectures				
Laboratory work				
Seminars (workshops/tutorials)		35	18	17
Self-study (ies), academic hours		*191*	*81*	*110*
Evaluation and assessment (exam or pass/fail grading)		*27*	*27*	
The course total workload	acc.hrs.	**288**	**144**	**144**
	Credits	**8**	**4**	**4**

5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course module title		Course topic title		Course module contents (topics)	Academic activities types
1	*History and modern structure of oil and gas industry.*	1.1	*History of oil and gas study and development.*	*Ancient and Pre-Industrial Use of Petroleum. Birth of the Modern Oil Industry (1850s-1900s). The 20th Century: Growth, Crises, and Transformation. The Modern Era:*	LC, S

				Unconventional Resources and Energy Transition.	
		1.2	*Structure of oil and gas business. Oil and gas project management and economics.*	*The Three Segments of the Industry: Upstream, Midstream, Downstream. Types of Companies: International, National, Independent, Service, Traders. Contractual Frameworks. Field life stages. Basics of Oil & Gas projects: Exploration and Production.*	LC, S
2	*Basics of oil&gas geology and engineering.*	2.1	*Geological structure of oil and gas accumulations.*	*The Petroleum System: source rock, migration, reservoir rock, trap, seal. Trap Classification. Reservoir Architecture - Key Parameters. Reservoir Architecture - Key Parameters.*	LC, S
		2.2	*Sedimentology.*	*Sedimentary processes. Reservoir structure. Depositional environments (fluvial, deltaic, desert, shoreline and beach, shelf, deep marine). Basics of Sequence stratigraphy. Seismic and Well Data integration.*	LC, S
		2.3	*Reservoir physics.*	*Porosity. Permeability. Fluid Saturation and Wettability. Capillary Pressure. Fluid PVT Properties.*	LC, S
3	*Exploration.*	3.1	*Seismic survey.*	*Seismic Survey: fundamentals of seismic methods, reflected wave method, common depth point method. 2D, 3D, 4D seismic.*	LC, S
		3.2	*Other types of geophysical survey (electric, gravity, magnetic, geochemical, airbone and satellite sensing).*	*Electrical and Electromagnetic Methods for oil and gas prospects. Gravity Survey: methods and results. Magnetic Survey: methods and results. Geochemical Survey: methods and results.*	LC, S
		3.3	*Exploration drilling.*	*Identification of the target drilling object. Well location selection. Drilling operations. Appraisal drilling.*	LC, S
4	*Formation Evaluation.*	4.1	*Well logging.*	*Lithological subdivision. Well-to-well correlation. Identification of productive intervals. Parameters for reserves calculation. Production monitoring.*	LC, S
		4.2	*Well testing.*	*Formation Testing (MDT/RFT). Reservoir Pressure Measurement. Build-Up Test (BU). Draw-Down Test (DD). Interference Test.*	LC, S
		4.3	*Core study.*	*What is a Core and Why is it Important? Core Acquisition Methods. Core Handling and Preservation. Petrophysical Laboratory Measurements. Sedimentological Core Description. Core-Log Integration.*	LC, S
5	*Reservoir characterization, geomodeling and simulation.*	5.1	*Formation stratification. Reservoir correlation. Reservoir properties.*	*Methods of formation stratification: lithological, petrophysical, and electrometric techniques. Well-to-well reservoir correlation: marker horizons, geological cross-sections, and zone maps. Key reservoir properties: porosity,*	LC, S

				permeability, and fluid saturation determination. *Net pay thickness determination and reservoir cutoff criteria.* *Reservoir heterogeneity and its impact on fluid distribution and development planning.*	
		5.2	*Production flow unit characterization. k-phi relationship. kH parameter.*	*Definition and identification of hydraulic flow units (HFU) using core and log data. Porosity–permeability (k–phi) cross-plots: empirical correlations and regression analysis. Flow Zone Indicator (FZI) and Reservoir Quality Index (RQI) for HFU classification. Calculation and application of the kH (permeability–thickness) parameter in well productivity assessment. Impact of flow unit heterogeneity on field development planning and well placement.*	LC, S
		5.3	*Clastic reservoir characterization (well logs, core, etc.). Open porosity (SP method).*	*Clastic sedimentary environments and their influence on reservoir architecture and quality. Well log interpretation for clastic reservoirs: resistivity, neutron, density, and sonic logs. Core analysis techniques: plug permeability, thin sections, and SEM imaging. SP (spontaneous potential) log: physical principles and lithological response in clastic sequences. Calculation of open (effective) porosity from the SP log using the alpha-SP method and cutoff calibration.*	LC, S
		5.4	*Clastic reservoir characterization (well logs, core, etc.). Vshale (GR method).*	Shale volume (Vshale) concept and its role in net reservoir identification and petrophysical modelling. Gamma Ray (GR) log: measurement principles, tool types, and lithological interpretation in clastic sequences. Vshale calculation methods: linear, Larionov (Tertiary and older), Clavier, and Stieber models. Integration of GR-derived Vshale with core clay content measurements and XRD mineralogy. Effect of Vshale on effective porosity, permeability cutoffs, and net-to-gross (NTG) ratio determination.	LC, S
		5.5	*Carbonate reservoir characterization (well logs, core, etc.). Dual porosity (vugs and fractures).*	*Carbonate depositional environments and diagenetic controls on reservoir quality. Well log responses in carbonates: neutron–density cross-plot, photoelectric factor (PEF), and acoustic log. Dual porosity concept: primary (matrix) vs. Natural fracture characterization: borehole image logs (FMI/FMS), core fracture analysis, and fracture intensity indices. Quantification of vugular and fracture porosity from well*	LC, S

				logs, core data, and dual-porosity petrophysical models.	
		5.6	*Geological data integration and 3D static modeling. Mapping and cross-sections. Reservoir performance and fluid flow simulation.*	*Data integration workflow: well logs, seismic interpretation, core analysis, and production data. Structural and stratigraphic framework modelling: fault systems, horizon picking, and 3D grid design. Geostatistical property population: kriging, sequential Gaussian simulation, and variogram analysis. Structural maps, isopach/isochore maps, and geological cross-sections as communication and interpretation tools. Static-to-dynamic model upscaling and setup for fluid flow simulation and reservoir performance forecasting.*	LC, S
6	*Well test methods of fluid flow study.*	6.1	*Build-up test. Pressure Drawdown test. Horner's plot.*	*Principles of well testing: objectives, design, and operational considerations for transient pressure analysis. Pressure buildup (BU) test: shut-in procedures, data acquisition, and quality control. Pressure drawdown (DD) test: constant rate flow period analysis and multi-rate testing. Horner plot construction and interpretation: skin factor, reservoir pressure, and flow regime identification. Superposition principle, pressure derivative analysis, and deconvolution in pressure transient interpretation.*	LC, S
		6.2	*Reservoir characterization using pressure vs. time records (porosity, fracturing, dynamic parameters, capillary properties and deformation parameters, such as Poisson's ratio, Young's modulus).*	*Identification of reservoir flow regimes from pressure derivative curves: radial, linear, bilinear, and boundary effects. Dynamic determination of porosity and total compressibility from transient pressure data. Natural fracture characterization from pressure transient behaviour: dual-porosity and dual-permeability models. Capillary pressure and wettability effects on well test interpretation in tight and mixed-wettability reservoirs. Geomechanical parameters from pressure data: Poisson's ratio, Young's modulus, and compaction/subsidence evaluation.*	LC, S
		6.3	*Drill Stem Test (DST).*	*DST objectives, tool configuration, and operational sequence: packer setting, flow periods, and shut-in periods. DST pressure and flow rate recording: interpretation of initial and final shut-in pressures (ISIP / FSIP). Integration of DST results with well log and core data for comprehensive reservoir characterization. Formation fluid sampling during DST: PVT sample collection, surface separation, and sample quality assessment. Quantitative*	LC, S

				interpretation of DST pressure data: permeability, skin factor, and static reservoir pressure.	
7	*Geological studies of oil & gas field development.*	7.1	*Relative phase permeability, wettability, irreducible oil saturation, and displacement coefficient.*	*Relative permeability (kr) curves: steady-state and unsteady-state measurement methods, normalization, and end-point calibration. Wettability concepts and measurement techniques: Amott index, USBM method, and contact angle analysis. Irreducible water saturation (Swirr) and residual oil saturation (Sor): laboratory determination and field implications. Displacement efficiency and its dependence on wettability, capillary number, and interfacial tension. Application of relative permeability data in reservoir simulation and EOR method design.*	LC, S
		7.2	*Geological studies for sidetracking and horizontal drilling, and hydraulic fracturing.*	*Geological prerequisites for sidetrack well design: target formation evaluation and structural mapping. Horizontal well trajectory planning: geosteering concepts, real-time log correlation, and look-ahead methods.* *Pre-fracture geological assessment: in-situ stress orientation, natural fracture mapping, and mechanical stratigraphy. Hydraulic fracture height containment: barrier identification from logs, core mechanical testing, and geomechanical modelling. Post-drilling and post-fracture geological evaluation: updated petrophysical interpretation and fracture characterization.*	LC, S
		7.3	*Measuring remaining oil saturation. Carbon/oxygen (C/O) logging.*	*Concept of remaining oil saturation and its significance for EOR screening and infill drilling decisions. Carbon/oxygen (C/O) logging: nuclear physics principles, inelastic neutron scattering, and tool design. Interpretation of C/O log data: porosity-independent oil saturation determination in cased wells. Comparison with other saturation monitoring techniques: time-lapse resistivity logging and tracer tests. Field applications: identification of bypassed oil zones and monitoring of EOR flood fronts.*	LC, S
8	*Reservoir treatment and stimulation.*	8.1	*Oil & gas recovery factors. Economic and technical challenges of field lifecycle.*	*Definition and classification of recovery factors: primary, secondary, and tertiary (EOR) mechanisms. Geological and reservoir factors controlling ultimate hydrocarbon recovery: heterogeneity, drive mechanisms, and fluid properties. Field lifecycle stages: discovery, appraisal, development, production plateau, decline, and late-life*	LC, S

				management. Economic evaluation metrics: NPV, IRR, break-even price, and lifting cost analysis across lifecycle stages. Technical challenges at mature field stage: water management, well integrity, infill drilling, and production optimization.	
		8.2	*Gas treatment. Removal of mechanical contaminants, hydrogen sulfide and carbon dioxide.*	*Gas Treatment. Removal of Mechanical Contaminants, Hydrogen Natural gas composition and quality specifications: sales gas requirements, pipeline standards, and custody transfer. Mechanical separation: scrubbers, cyclone separators, and filter-separators for liquid and solid contaminant removal. Hydrogen sulfide (H2S) removal: amine gas treating (MEA, DEA, MDEA), Claus sulphur recovery, and tail gas treatment. Carbon dioxide (CO2) removal: chemical and physical absorption, membrane separation, and cryogenic processes. Gas dehydration, mercury removal, and dew point control: TEG absorption, activated carbon beds, and molecular sieves.*	LC, S
		8.3	*Enhanced oil recovery (EOR). Hydrofracturing, acidizing treatment, acoustic well treatment, water-alterating-gas (WAG).*	*EOR screening criteria: reservoir and fluid property requirements for thermal, chemical, gas, and other EOR method selection. Hydraulic fracturing design and execution: fracture geometry modelling, proppant selection, fluid systems, and post-fracture evaluation. Acid stimulation techniques: matrix acidizing in sandstone reservoirs and acid fracturing in carbonate formations. Acoustic and vibroseismic well treatment: physical mechanisms, equipment, and applicability in low-permeability formations. Water-alternating-gas (WAG) injection: design principles, gas injection cycles, mobility control, and recovery improvement.*	LC, S
9	*Monitoring systems for field development.*	9.1	*Monitoring reservoir pressure. Reservoir pressure mapping tools (isobar maps).*	*Significance of reservoir pressure monitoring in field development management and material balance calculations. Methods of reservoir pressure measurement: downhole gauges, RFT/MDT wireline tools, and shut-in pressure tests. Pressure decline analysis: tank model material balance, aquifer influx assessment, and compaction drive. Construction and interpretation of isobar maps: spatial interpolation methods, data sources, and uncertainty assessment. Pressure maintenance strategies: water injection, gas injection, and monitoring of their*	LC, S

				effectiveness on field scale.	
		9.2	*Monitoring inflow allocation, composition and rate in a cased wellbore, production logging tools (spinner flowmeters, fluid density, fluid capacitance, thermometry, barometry).*	*Production logging survey design: zonal contribution objectives, tool string selection, and logging programme. Spinner flowmeter interpretation: calibration procedures, velocity profiles, and zonal flow rate calculation. Fluid identification tools: fluid density (gradiomanometer), fluid capacitance (holdup), and multiphase flow characterization. Temperature and pressure profiling: fluid entry point identification, crossflow detection, and geothermal gradient analysis. Integrated production log interpretation: combining multiple tools for comprehensive zonal inflow characterization.*	LC, S
		9.3	*Monitoring wellbore integrity (downhole video cameras, multifinger caliper, casing collar locator, sonic methods. Monitoring waterflooding (injected isotope markers tracking, interference test).*	*Wellbore integrity assessment framework: corrosion mechanisms, deformation failure modes, and regulatory requirements. Mechanical caliper and multifinger caliper (MFC) surveys: casing wear quantification, ovality detection, and anomaly mapping. Acoustic cement evaluation: cement bond log (CBL), variable density log (VDL), and pulse-echo ultrasonic tools. Waterflood monitoring strategies: sweep efficiency evaluation, breakthrough detection, and conformance control measures. Tracer testing and interference testing: design, injection procedures, sampling protocols, and flood front tracking interpretation.*	LC, S

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	

Type of academic activities	Classroom equipment	Specialised educational / laboratory equipment, software, and materials for course study (if necessary)
	be used for seminars and consultations), equipped with a set of specialised furniture and computers with access to the electronic information and educational environment.	

* The premises for students' self-studies are subject to **MANDATORY** mention

7. RESOURCES RECOMMENDED FOR COURSE STUDY

Main readings:

1. Zhdanov, M. A. Oil field geology and estimation of oil and gas reserves. – Moscow: Nedra, 1981. – 453 p.
2. Koronovsky, N. V., Starostin, V. I., Avdonin, V. V. Geology for mining engineering: textbook for universities. – Moscow: Publishing Center "Academy", 2007. – 576 p.
3. Latysheva, M. G., Vendelstein, V. Yu., Tuzov, V. P. Processing and interpretation of geophysical well logging. – Moscow: Nedra, 1990.
4. Permyakov, I. G., Khairedinov, N. Sh., Shevkunov, E. N. Oil and gas field geology and geophysics: textbook for universities. – Moscow: Nedra, 1986. – 269 p.
5. Strelchenko, V. V. Geophysical well logging: textbook for universities. – Moscow: Nedra-Business Center LLC, 2008.
6. Tetelmin, V. V., Yazev, V. A. Fundamentals of oil and gas drilling: textbook. – 3rd ed. – Dolgoprudny: Intellect Publishing House, 2014. – 296 p. : ill. (Series "Oil and Gas Engineering").
7. Tetelmin, V. V., Yazev, V. A. Oil and gas engineering. Complete course: textbook. – Series "Oil and Gas Engineering". – 2009. – 900 p.

Additional(optional) reading (sources):

8. Bakirov, E. A., Ermolkin, V. I., Larin, V. I., et al. Geology of oil and gas. – Moscow: Nedra, 1990.
9. Belokon, D. V. Downhole geophysical information and measurement systems. – Moscow: Nedra, 1996.
10. Borzunov, V. M. Exploration and industrial assessment of non-metallic mineral deposits. – Moscow: Nedra, 1982. – 310 p.
11. Bogdanovich, N. N., Desyatkin, A. S., Dobrynin, V. M., et al. Geophysical well logging: Handbook of field geophysics master. – Moscow: Infra-Engineering, 2009. – 960 p.
12. Bulatov, A. I., Proselkov, Yu. M. Drilling and development of oil and gas wells. Terminological dictionary-reference. – Moscow: Nedra-Business Center LLC, 2007. – 255 p.
13. Geophysics: textbook for universities / edited by V. K. Khmelevsky. – Moscow: KDU, 2007, 2009, 2012.
14. Gorbachev, Yu. I. Geophysical well logging: textbook for universities. – Moscow: Nedra, 1990.
15. Dakhnov, V. N. Electrical and magnetic methods of well logging. – Moscow:

Nedra, 1981. – 344 p.

16. Dobrynin, V. M., Vendelstein, B. Yu., Kozhevnikov, D. A. Petrophysics: textbook for universities. – Moscow: Oil and Gas, 2004.

17. Zimina, S. V. Geological foundations of oil and gas field development: textbook. – Tomsk: TPU Publishing House, 2004. – 175 p.

18. Ivanova, M. M., Cholovsky, I. P., Gutman, I. S., Vagin, S. B., Bragin, Yu. I. Oil field geology and hydrogeology of hydrocarbon deposits. – Moscow: Oil and Gas, 2002. – 455 p.

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/

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 Modern aspects of geological and geophysical research in the oil and gas industry / Современные аспекты геолого-промысловых и геофизических исследований в нефтегазовом деле.

2. Guidelines for students on the development of the course Modern aspects of geological and geophysical research in the oil and gas industry / Современные аспекты геолого-промысловых и геофизических исследований в нефтегазовом деле.

*The training toolkit and guidelines for the course are placed on the course page in the university telecommunication training and information system under the set procedure.

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