



K.I.Turyusov Institute of Geology and Oil and Gas Industry
Department of Hydrogeology, Engineering and Oil and Gas Geology

EDUCATIONAL PROGRAM
7M07221 - "Oil and Gas Geology"

Code and classification of the field of education: 7M07 Engineering, manufacturing, and construction industries

Code and classification of training areas: 7M072

Manufacturing and processing industries

Educational program group: M121

Geology Level of NRC: 7

Level of ORC: 7

Duration of study: 1

Number of credits: 60

Алматы 2025

Educational program 7M07221 - "Oil and Gas Geology" approved at the meeting of the Academic Council of KazNTU named after K.I. Satpayev

Minutes # 10 dated «06 » 03 2025.

Reviewed and recommended for approval at a meeting of the Educational and Methodological Council of KazNTU named after K.I. Satpayev.

Minutes # 3 dated «20 » 12 2024 .

Educational program 7M07221 - "Oil and Gas Geology" Developed by the Academic Committee for Production and Manufacturing Industries

NAME	Degree/ academic title	Position	Place of work	Caption
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Yensepbayev Talgat Ablaevich	Candidate of Geological and Mineralogical Sciences	Professor	of NAO "Kazakh National Research Technical University named after K. I. Satpayev", mobile phone: +7 777 693 22 44, t.yensepbayev@satbayev.university	
Muratova Samal Karimbayevna	Candidate of Technical Sciences	Associate Professor	of NAO "K. I. Satpayev Kazakh National Research Technical University K.I. Satpayev", mobile phone: +77077633534, s.muratova@satbayev.university	
Employers:				
Paragulgov Timur Halitovich	Candidate of Geological-and Mineralogical Sciences	Director of Geology, GIS Energy LLP»	Advisor on Geology and Geophysics of RAMCO OIL LLP +7 7017600656	
Students:				

Zhakyp Aruzhan Shalkarbekkyzy	-	1-year Master's student	of NAO "Kazakh National Research Technical University named after K. I. Satpayev", mobile phone: 87077784640 aruzhanzhakyp003@gm ail.com	
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Table of contents

List of abbreviations and designations

1. Description of the educational program
2. The purpose and objectives of the educational program
3. Requirements for evaluating the learning outcomes of an educational program
4. Passport of the educational program
- 4.1. General information
- 4.2. The relationship between the achievability of the formed learning outcomes according to the educational program and academic disciplines
5. The curriculum of the educational program

List of abbreviations and notations

BD - basic disciplines
GOSO - state obligatory standard of education
DP - documented procedure
DOT - distance education technologies
UNT - unified national testing
IEP - individual education plan
KTO - credit-based learning technology
KED - catalog of elective disciplines
MES RK - Ministry of Education and Science of the Republic of Kazakhstan
MOP - modular educational program
R&D - research work
R&D and ID - research and innovation activities
NIRS - research work of students
GEC - general education disciplines
EP - educational program
PD - specialized disciplines
PPS - faculty - teaching staff
RK - Republic of Kazakhstan
RUP - working curriculum
QMS - quality management system
SRS - independent work of students
SRSP - independent work of students under the guidance of a teacher
TUPL - model curriculum
Auxiliary personnel - teaching and support staff
UMKD - teaching and methodical complex of disciplines
UMS - educational and methodical council
UMR - educational and methodological work
ELM - electronic learning materials

1. Description of the Educational Program

The program is aimed at training specialists for the oil and gas industry who are capable of solving practical tasks using modern experimental and research methods. The learning format is intensive with a focus on practice.

Program Structure:

Theoretical Block:

- Core Component: Modern Challenges in Oil and Gas Geology
- Specialized Disciplines: Geological Modeling, Methods of Prospecting and Exploration of Deposits

Practical Block:

- Field and Laboratory Practices
- Experimental and Research Work Using Modern Equipment

Experimental Research Block:

- Conducting Experiments and Laboratory Studies
- Processing and Interpretation of Obtained Data
- Preparation of a Master's Thesis Based on Experimental Data

Final Certification

Program Features:

- Use of Modern Laboratory Equipment
- Conducting Experiments to Study Rock Reservoir Properties
- Laboratory Studies of Oil and Gas Fluids
- Mastering Methods of Experimental Geology at a Modern Level

Learning Outcomes Graduates will possess:

- Methods of Experimental Research in Geology
- Skills for Working with Modern Laboratory Equipment
- Technologies for Processing Experimental Data
- Modern Methods of Laboratory Analysis

Career Prospects:

- Laboratory Research Specialist in Oil and Gas Companies
- Experimental Scientist in Research Centers
- Geologist-Analyst in Service Companies
- Research Quality Control Specialist

2. Goal and Objectives of the Educational Program

Goal of the EP: To train a highly qualified specialist in oil and gas geology and field development, capable of performing various project, technological, organizational, and managerial activities at a high technical level, while forming the knowledge and skills necessary for professional work in state, geological exploration, and oil and gas production enterprises.

Professional Objectives:

- To train specialists capable of designing and optimizing technological processes at all stages of the geological study of fields—from regional exploration to development and production.

- To develop skills for solving production tasks during field operations: geological, geophysical, and geochemical studies, including office data processing and laboratory analyses.

- To teach how to work with modern field and laboratory equipment, mastering methods of primary geological documentation and data interpretation.

Personal and Civic Objectives:

- To cultivate highly professional specialists with developed moral and ethical qualities, civic responsibility, and adherence to the legislation of the Republic of Kazakhstan.

- To form professional culture and ethics, preparing students for socially significant activities in a multi-ethnic environment.

Professional Development Objectives:

- To develop the ability for continuous self-education and adaptation to new technologies in the geological exploration industry.

- To prepare students for effective work in the context of the industry's digital transformation, mastering modern information technologies and data analysis methods.

Managerial and Research Objectives:

- To develop competencies in production management and the organization of technological processes.

- To cultivate research skills and the ability to formulate and implement new scientific directions.

- To prepare students for work in an international environment, including proficiency in professional terminology and understanding of global standards.

The program aims to train competitive specialists ready to solve complex tasks in the rapidly developing oil and gas industry.

Objectives of the Educational Program:

- Intensive practice-oriented training of specialists to solve current production tasks at the stages of operation and additional exploration of oil and gas fields using modern technological solutions.

- Formation of competencies for the operational conduct of geological, geophysical, and laboratory studies using specialized equipment and software, including primary analysis and documentation of results.

- Preparing graduates for professional activities in accordance with the requirements of the legislation of the Republic of Kazakhstan, norms of professional ethics, and the principles of corporate culture in the oil and gas industry.

- Developing the ability for rapid adaptation and mastery of new technologies in the context of digitalization and technological modernization of the geological exploration industry.

- Forming practical skills in the field of production monitoring, data analysis, and making technological decisions using modern information systems and digital resources.

- Training a specialist capable of performing professional functions in production, technological, and analytical activities, taking into account the specific requirements of employers in the oil and gas sector.
- Training a competitive specialist proficient in methods of experimental research work and the practical application of modern technologies to solve urgent tasks faced by oil and gas production enterprises.

1. Requirements for Assessing Learning Outcomes of the Educational Program

Upon completion of the educational program "7M07221 - Oil and Gas Geology," master's students will be able to:

ON 1. Create technological solutions for various aspects of the study of oil and gas fields and sedimentary basins, based on modern theories and methods, integrate and apply innovative developments in practice.

ON 2. Show high professional qualities and ethics when interacting with various stakeholders, during the performance of production tasks, defend plans and results of work in front of specialists and experts in the geological and oil and gas industry.

ON 3. Apply advanced knowledge of oil and gas geology, appropriate methods of analysis, both qualitative and quantitative in their professional activities.

ON 4. Create models of oil and gas bearing sedimentary basins, oil and gas fields based on computer programs and technologies.

ON 5. Summarize and interpret information from various sources, analyze and evaluate current trends and directions, patterns of development of domestic and foreign geological exploration, oil and gas industries.

ON 6. To make an examination of technological, experimental projects in the conditions of internationalization and rapid updating of information flows.

The following forms of examinations are used to assess learning outcomes: written exam, practical exam (open-ended questions, problem-solving), experimental research work.

Final certification concludes with the defense of a master's thesis.

4. Passport of the educational program

4.1. General information

№	Field name	Note
1	Code and classification of the field of education	7M07 Engineering, Manufacturing and Construction Industries
2	Code and classification of training directions	7M072 Mining and Processing Industries
3	Group of educational programs	M121 - Geology
4	Name of educational program	7M07221 – Oil and Gas Geology
5	Brief description of the educational program	The Master's program "Oil and Gas Geology" is aimed at training highly qualified specialists capable of solving complex tasks in the exploration,

		prospecting, and development of hydrocarbon fields. The training focuses on the intensive mastery of practice-oriented disciplines and modern technologies used in the oil and gas industry. The program combines fundamental training with applied aspects, providing graduates with competitive advantages in the global labor market.
6	Purpose of the OP	Training of a highly qualified specialist in the field of oil and gas geology and field development, capable of performing various project, technological, organizational and managerial activities at a high technical level, while forming the knowledge and skills necessary for professional work in state, geological exploration and oil and gas production enterprises.
7	Type of OP	Новая ОП
8	NSC level	7
9	ORC level	7
10	Distinctive features of the OP.	нет
11	List of competencies of the educational program:	Ability to apply modern methods of geological modeling to assess the oil and gas potential of territories and fields Proficiency in technologies for interpreting geological and geophysical data using specialized software Ability to conduct comprehensive analysis of rock reservoir properties and filtration-capacity characteristics of productive formations Skills in designing and optimizing technological processes at all stages of geological field studies Capability to organize and conduct field geological, geophysical and geochemical studies
12	Educational Program Learning Outcomes	ON 1. Create technological solutions for various aspects of the study of oil and gas fields and sedimentary basins, based on modern theories and methods, integrate and apply innovative developments in practice. ON 2. Show high professional qualities and ethics when interacting with various stakeholders, during the performance of production tasks, defend plans and results of work in front of specialists and experts in the geological and oil and gas industry. ON 3. Apply advanced knowledge of oil and gas geology, appropriate methods of analysis, both qualitative and quantitative in their professional activities. ON 4. Create models of oil and gas bearing sedimentary basins, oil and gas fields based on computer programs and technologies. ON 5. Summarize and interpret information from various sources, analyze and evaluate current trends and directions, patterns of development of domestic

		and foreign geological exploration, oil and gas industries. ON 6. To make an examination of technological, experimental projects in the conditions of internationalization and rapid updating of information flows.
13	Form of training	full-time
14	Term of study	1 years
15	Loan volume	60
16	Languages of instruction	Russian, Kazakh, English
17	Academic degree awarded	Master of Engineering and Technology
18	Developer(s) and authors:	Yensepbayev Talgat Ablaevich Uzbekgaliev Rizakhan Khalelovich Eskozha Bazar Atashevich

4.2. Relationship between the achievability of the formed learning outcomes of the educational program and academic disciplines

№	Name of discipline	Brief description of the discipline	Cycle	Component	Loans	ON 1	ON 2	ON 3	ON 4	ON 5	ON 6
1	LNG212 Foreign language (professional)	The purpose of the discipline is to acquire and improve competencies in accordance with trade standards of foreign education, capable of competing in the labor market, because through a foreign language, the future master gains access to academic knowledge, new technologies and modern information, allowing the use of a foreign language as a means of communication in the intercultural, professional and scientific activities of the future master.	BD	UC	2	+		+	+	+	+
2	MNG726 Management	To form a scientific understanding of management as a type of professional activity. Contents: Mastering the general theoretical principles of managing socio-economic systems; acquiring skills and abilities in practical problem-solving of managerial issues; studying global management practices and the specificities of Kazakhstani management; training in solving practical issues related to managing various aspects of organizational activities.	BD	UC	2	+	+				+
3	HUM211 Psychology of management	To acquire skills in making strategic and managerial decisions, taking into account the psychological	BD	UC	2	+	+	+			

		characteristics of the individual and the team. Content: the modern role and content of psychological aspects in management activities, methods for improving psychological literacy, the composition and structure of management activities, both at the local and foreign levels, the psychological feature of modern managers.									
4	GEO751 Lithology of reservoir of oil and gas	Purpose: types of lithogenesis and their characteristic rock complexes that form natural reservoirs of oil and gas. Course content: the main stages of the formation of sedimentary rocks; main features of continental, marine and transitional facies; distinctive features of the main genetic types of natural reservoirs of hydrocarbons; the degree of influence of post-sedimentary transformations on the main field characteristics during the exploitation of hydrocarbon deposits; the main criteria for predicting the development zones of reservoir rocks, screen rocks and traps of the lithological type.	BD	EC	4	+	+	+		+	
5	GEO752 Oil and gas hydrogeology	The purpose of the course is to gain knowledge about the hydrogeology of oil and gas basins, the role of groundwater in the formation, preservation and destruction of hydrocarbon deposits. Course content: mastering theoretical knowledge on the	BD	EC	4	+	+	+			

		hydrogeology of oil and gas basins, groundwater occurrence conditions, lateral and vertical hydrogeochemical zonality of basins, the main genetic types of waters and the stages of formation of their composition, hydrogeological criteria for the prospects of oil and gas potential, the basics of oil and gas field hydrogeology. Influence of groundwater flows on the migration potential of generated hydrocarbons.									
6	GEO294 Filtration properties of reservoirs and enhanced oil recovery	Purpose: study of reservoir properties of rocks, physical and chemical properties of reservoir fluids necessary for calculating oil recovery from reservoirs. Course content: physical and mechanical properties of oil and gas reservoirs; composition and physical properties of natural gases, oils and formation waters in the conditions of their occurrence; methods for measuring the petrophysical characteristics of rocks, phase states of hydrocarbon systems at various pressures and temperatures; molecular-surface properties of the "oil-gas-water-rock" system; physical basis of oil displacement from porous media.	PD	EC	5		+	+		+	+
7	GEO746 Theoretical and methodological patterns of allocation	Purpose: modern methods of prospecting and exploration for oil and gas in the offshore part of the world	PD	EC	5	+	+	+		+	+

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

	of resources and hydrocarbon reserves on the shelf and water area	ocean, distribution of the hydrocarbon resource base in the country and around the world. Course content: processes of formation of hydrocarbon deposits, geophysical, hydrogeological and engineering-geological studies at the regional stage and prospecting and exploration stages, the basics of rational use of subsoil, environmental protection in the shelf zone; relationship between the distribution of oil and gas resources and the evolution of sedimentary basins on the margins of the continents.									
8	GEO263 The analysis of sedimentary basins	The purpose of the course: structure, composition, genesis and stages of development of sedimentary basins. Course content: evolution of sedimentary basins, their development depending on tectonic movements and sea level fluctuations, the rate of subsidence of the sedimentation basin, the principle of isostasy, the multi-order periodicity of sedimentation and its role in the formation of sedimentary basins, the relationship between the rates of denudation of feeding areas and filling of sedimentary basins, their geodynamic classifications in the concept of lithospheric plate tectonics.	PD	EC	5	+	+		+		+
9	GEO745 Sedimentation and facies conditions	The main purpose of studying the discipline is to determine the facies, to familiarize with the specifics of	PD	EC	5	+	+		+	+	

	during the formation of oil and gas complexes	continental, marine and transitional sedimentation environments. The course content is aimed at studying sedimentary basins, their classification, geodynamically diverse types of sedimentary basins with an analysis of their geometry and other characteristics, the relationship between the types of sedimentary basins and their oil and gas potential, the patterns of the largest hydrocarbon accumulations in the sedimentary basin system.									
10	GEO291 Regional tectonics of oil and gas regions	Purpose: study of the structure and evolution of large structural units of the continental crust, comparative analysis of the tectonics of various oil and gas bearing areas against the background of the general evolution of the earth and in the light of modern tectonic concepts. Course content: plate tectonics, ancient platforms, epicalcedonian, epihercynian, epimesozoic, platforms, geodynamic regimes of oil and gas formation, lithospheric plate boundaries, passive, active continental margins, rift basins, subduction basins. The history of the geological development of the region, the processes accompanying the formation of oil and gas bearing areas of sedimentary basins.	PD	EC	5		+	+		+	

11	GEO293 Paleotectonic analysis methods	Purpose: to study the processes of formation and subsequent transformation of structural forms of sedimentary deposits based on paleostructural and paleotectonic methods, their application in the search for oil and gas fields. Course content: the main geological processes leading to the formation of stratocomplexes; characterization of the main geological facies and formations; classification of stratigraphic unconformities and conditions of their manifestations; methods for compiling paleotectonic maps, schemes, profiles, isopach maps; analysis and interpretation of paleogeological sections, maps.	PD	EC	5	+	+	+	+		
12	GEO295 Modeling of fluid flows and sources of oil and gas formation	The purpose of the course is to model oil and gas generating and oil and gas bearing regional local systems to improve the reliability and sustainability of energy production. Contents: analysis of structural and geochemical features, construction of models based on maps and profiles, editing horizons, determination of stratigraphic breaks, control of lithological and temporal parameters, calibration of underground layers, quality control of input lithological and temporal parameters of the model in 1D. These skills contribute to sustainable economic recovery	PD	EC	5		+	+	+	+	+

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
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		through the efficient use of energy resources.									
13	GEO292 Prediction and assessment of oil and gas resources	The purpose of the course: scientifically based forecast of oil and gas content of the subsoil, methods for estimating resources at the regional stage of geological exploration. Course content: skills in collecting documentation, analyzing and summarizing geological and geophysical, geochemical, hydrogeological and other materials of regional and detailed geological exploration for the purpose of a scientifically based forecast of oil and gas content of the subsoil; choosing the optimal directions for prospecting and exploration of hydrocarbon accumulations, designing oil and gas prospecting, assessing oil and gas resources and substantiating the technical and economic feasibility of setting up prospecting and exploration work.	PD	EC	5	+	+		+		+

5. Curriculum of the educational program

NON-PROFIT JOINT STOCK COMPANY
"KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY NAMED AFTER K.I. SATBAYEV"



«APPROVED»
Decision of the Academic Council
NPJSC «KazNRTU»
named after K.Satbayev»
dated 06.03.2025 Minutes № 10

WORKING CURRICULUM

Academic year	2025-2026 (Autumn, Spring)
Group of educational programs	M121 - "Geology"
Educational program	7M07221 - "Oil and gas geology"
The awarded academic degree	Master of engineering and technology
Form and duration of study	full time (professional track) - 1 years

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	Lk/Ab/pr Contact hours	In hours SES (including TS4S)	Form of control	Allocation of face-to-face training based on courses and semesters		Prerequisites
									1 course		
									1 sem	2 sem	
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)											
CYCLE OF BASIC DISCIPLINES (BD)											
M-1. Module of basic training (university component)											
LNG212	Foreign language (professional)		BD, UC	2	60	0/0/30	30	E	2		
MNG726	Management		BD, UC	2	60	15/0/15	30	E	2		
HUM211	Psychology of management		BD, UC	2	60	15/0/15	30	E	2		
GEO751	Lithology of reservoir of oil and gas	1	BD, CCH	4	120	30/0/15	75	E	4		
GEO752	Oil and gas hydrogeology	1	BD, CCH	4	120	30/0/15	75	E	4		
CYCLE OF PROFILE DISCIPLINES (PD)											
M-2. Module of Sedimentary basin analysis (component of choice)											
GEO294	Filtration properties of reservoirs and enhanced oil recovery	1	PD, CCH	5	150	30/0/15	105	E	5		
GEO746	Theoretical and methodological patterns of allocation of resources and hydrocarbon reserves on the shelf and water area	1	PD, CCH	5	150	30/0/15	105	E	5		
GEO263	The analysis of sedimentary basins	2	PD, CCH	5	150	30/0/15	105	E	5		
GEO745	Sedimentation and facies conditions during the formation of oil and gas complexes	2	PD, CCH	5	150	30/0/15	105	E	5		
M-3. Module of tectonics (component of choice)											
GEO291	Regional tectonics of oil and gas regions	1	PD, CCH	5	150	30/0/15	105	E	5		
GEO293	Palaeotectonic analysis methods	1	PD, CCH	5	150	30/0/15	105	E	5		
M-4. Module of modeling and forecasting (component of choice)											
GEO292	Prediction and assessment of oil and gas resources	1	PD, CCH	5	150	30/0/15	105	E	5		
GEO772	Modeling of fluid flows and sources of oil and gas formation	1	PD, CCH	5	150	30/0/15	105	E	5		
M-5. Practice-oriented module											
AAP210	Production practice		PD, UC	9				R		9	
M-6. Experimental research module											
AAP257	Experimental research work of a master student, including an internship and the implementation of a master's project		ERWMS	13				R		13	
M-7 Module of final attestation											
ECA212	Registration and protection of the master thesis		FA	8						8	
Total based on UNIVERSITY:									30	30	
									60		

Number of credits for the entire period of study					
Cycle code	Cycles of disciplines	Credits			
		Required component (RC)	University component (UC)	Component of choice (CCH)	Total
GED	Cycle of general education disciplines	0	0	0	0
BD	Cycle of basic disciplines	0	6	4	10

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имени К.И. САТПАЕВА»

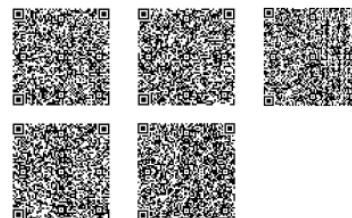
PD	Cycle of profile disciplines	0	9	20	29
Total for theoretical training:		0	15	24	39
RWMS	Research Work of Master's Student				0
ERWMS	Experimental Research Work of Master's Student				13
FA	Final attestation				8
TOTAL:					60

Decision of the Educational and Methodological Council of KazNRTU named after K.Satpayev. Minutes № 3 dated 20.12.2024

Decision of the Academic Council of the Institute. Minutes № 3 dated 28.11.2024

Signed:
Governing Board member - Vice-Rector for Academic Affairs Uskenbayeva R. K.

Approved:
Vice Provost on academic development Kalpeyeva Z. B.
Head of Department - Department of Educational Program Management and Academic-Methodological Work Zhumagaliyeva A. S.
Director - Geology and Oil-gas Business Institute named after K. Turyssov Auyelkhan Y. .
Acting Department Chair - Hydrogeology, Engineering and Oil and Gas Geology Akpanbayev R. C.
Representative of the Academic Committee from Employers Paragulgov T. K.
____Acknowledged____



Note:

1. Module of basic training and professional activity departments themselves prescribe the names of modules and their number
2. * - Division into types of work at the discretion of the department
3. If necessary, the disciplines: Physics II, Mathematics III, General Chemistry of the department include at the expense of credits of the department component DB, VC from the basic training module
4. The full academic load of one academic year should be 60 academic credits
5. The application of the catalog of elective subjects is the same as the Curriculum is divided into modules, with the inclusion of the Module "R&D"