



Institute of Geology and Oil and Gas Engineering named after K.I. Turysov
Department of Hydrogeology, Engineering and Petroleum Geology

EDUCATIONAL PROGRAM
8D07215- "Geology and exploration of fossil fuels"

Code and classification of the field of education: 8D07 Engineering, manufacturing and construction industries

Code and classification of training areas: 8D072 Manufacturing and processing industries

Group of educational programs: D121 Geology

NRC level: 8

ORK level: 8

Duration of study: 3

Volume credits: 180

Almaty 2025

Educational program 8D07215- "Geology and exploration of fossil fuels"

approved at a meeting of the Academic Council of KazNITU named after K.I. Satpayev

Protocol No. 10 of "10" 03 _ 2025

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

Protocol No. 3 of "20" 12_ 2025

The educational program 8D07215- "Geology and Exploration of Fossil Fuels" was developed by the academic committee in the direction of " Production and Manufacturing Industries"

Full name	Academic degree/ academic title	Job title	Place of work	Signature
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named after K.I. SATPAYEV"

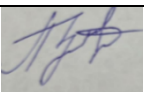
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List of abbreviations and designations

BD – basic disciplines
GOSO – state compulsory education standard
DP – documented procedure
DOT – distance educational technologies
UNT – Unified National Testing
IEP – individual educational plan
KTO – credit-based learning technology
KED – catalog of elective courses
MES RK – Ministry of Education and Science of the Republic of Kazakhstan
MOP – modular educational program
R&D – scientific research work
NIRD - scientific research activity
NIRM – research work of a master's student
OOD – general education disciplines
OP – educational program
PD – major disciplines
PC – personal computer
PPS – professorial and teaching staff
RK – Republic of Kazakhstan
RUP – working curriculum
QMS – quality management system
SRD – independent work of a master's student
SRDP – independent work of master's students under the supervision
teacher
TYIIII – standard curriculum
UVP – educational and support personnel
UMKD – educational and methodological complex of disciplines
UMS – educational and methodological council
UMR – educational and methodological work
EUM – electronic educational materials

1. Description of the educational program

The educational program for training a Doctor of Philosophy (PhD) has a scientific and pedagogical focus and involves fundamental educational, methodological and research training and in-depth study of disciplines in relevant areas of science for the system of higher and postgraduate education and the scientific sphere.

The educational program for training a doctorate in this field involves fundamental educational, methodological, and research training and in-depth study of disciplines in relevant areas of science for geological fields.

Doctoral educational programs in terms of professional training are developed based on a study of the experience of foreign universities and research centers implementing accredited programs for training PhD doctors or doctors in the relevant field.

The content of the educational program for specialized doctoral studies is established by the university independently.

The main criterion for completion of the educational process for training Doctors of Philosophy (PhD) (doctor in the profile) is the mastery by the doctoral student of at least 180 academic credits, including all types of educational and scientific activities.

The duration of doctoral study is determined by the number of academic credits earned. Upon completion of the required number of academic credits and achievement of the expected learning outcomes for a Doctor of Philosophy (PhD) degree or related field, the doctoral program is considered fully completed.

The training of personnel in doctoral studies is carried out on the basis of educational programs for doctoral studies in the following field: specialized, with a period of study of at least three years.

Contents of the OP

Objectives of the educational program:

- Preparing graduates for professional activity, developing spiritual values, moral and ethical standards of the individual as a member of society, and implementing the legal and legislative system of the Republic of Kazakhstan with a high level of professional culture and civic position.
- Preparing graduates for continuous self-improvement and self-development, acquiring new knowledge, skills, and abilities in innovative areas of development in the geological exploration, hydrogeological, and oil industry.
- To prepare graduates competent in production-management, organizational-technological, and scientific-pedagogical fields using modern educational information technology tools and resources. Graduates are capable of independently formulating and implementing new research directions .
- Training of a graduate, based on the diversity and dynamism of the catalogue of elective disciplines of the curriculum, with a predominance of practical skills in competencies, capable of performing professional functions within the framework of one or more types of activities based on the final learning outcomes, taking into

account the specifics of these types of activities, market requirements for organizational, managerial, and professional competencies.

- To prepare graduates as competitive specialists in the field of geological exploration and oil and gas production, including through increasing the international aspect in educational and scientific programs, competent in the field of advanced technologies, the implementation and presentation of scientific research results

2. The purpose and objectives of the educational program

The objective of the educational program is to train highly qualified specialists in the field of fossil fuel geology, capable of solving current problems in the geological industry, conducting scientific research, including the development of software and new technologies, as well as methods for prospecting, exploration, and development of fossil fuel deposits.

To achieve this goal, doctoral students, according to the curriculum, acquire knowledge in two cycles of academic disciplines: basic disciplines (BD) and specialized disciplines (PD).

The main objectives of the educational program "Geology and Exploration of Fossil Fuels" are:

- *in specialized training* :

- 1) obtaining in-depth knowledge and skills in the field of petroleum and oil field geology;

- 2) development of the ability for self-improvement and self-development, acquisition of skills and motivation for independent creative acquisition of new knowledge throughout active life;

- 3) mastering fundamental courses at the intersection of sciences, guaranteeing professional competence and mobility.

The program's mission is to ensure the qualitative growth of the region's human capital in the field of hydrocarbon exploration and field geology, through the development of an innovative and scientific-educational environment and the training of highly qualified personnel with high personal and professional competencies in accordance with market needs.

The objects of professional activity of doctoral graduates are:

- design and survey, production and technological and expert management in the field of subsoil use;

- research in the areas of science and education related to petroleum and oil field geology.

Doctoral students can perform the following types of professional activities:

- scientific research.

Training in this specialty is conducted within the framework of approved curricula. The knowledge acquired by doctoral students in a range of specialized disciplines has proven to be highly sought after by industrial and scientific organizations involved in the study and application of innovative methods for forecasting, prospecting, exploration of hydrocarbon deposits, and subsequent

monitoring of their development.

The duration of study for the educational program “ 8D07 215 - Geology and Exploration of Fossil Fuels” is 3 years, with 2 semesters lasting 15 weeks each in each academic year (6 semesters in total).

Final assessment takes the form of an exam. The preferred form of examination is an oral questioning of doctoral candidates. The final decision on whether to conduct oral or written examinations is made by the university's Academic and Methodological Council based on the submissions of the academic institutions.

Admission to KazNITU named after K.I. Satpayev is carried out through the placement of a state educational order (educational grants), as well as tuition fees from citizens' own funds and other sources.

educational program is popular among doctoral graduates in this specialty. The state provides up to 3-4 grants annually for training in this program.

The program's objectives are:

Objectives of the educational program:

- Preparing graduates for professional activity, developing spiritual values, moral and ethical standards of the individual as a member of society, and implementing the legal and legislative system of the Republic of Kazakhstan with a high level of professional culture and civic position.
- Preparing graduates for continuous self-improvement and self-development, acquiring new knowledge, skills, and abilities in innovative areas of development in the geological exploration, hydrogeological, and oil industry.
- To prepare graduates competent in production, management, organizational, technological, and scientific-pedagogical fields using modern educational information technology tools and resources. Graduates are capable of independently formulating and implementing new research directions.
- Training of a graduate, based on the diversity and dynamism of the catalogue of elective disciplines of the curriculum, with a predominance of practical skills in competencies, capable of performing professional functions within the framework of one or more types of activities based on the final learning outcomes, taking into account the specifics of these types of activities, market requirements for organizational, managerial, and professional competencies.
- To prepare graduates as competitive specialists in the geological exploration and oil and gas production sectors, including through an increased international focus in educational and scientific programs, competent in advanced technologies, and the implementation and presentation of scientific research results.

3. Requirements for the assessment of learning outcomes of the educational program

By the end of the educational program " 8D07215 - Geology and Exploration of Fossil Fuels " doctoral students will be able to:

PO 1. Study and critically evaluate advanced scientific achievements in the field of fossil fuel geology in the context of globalization and internationalization,

identifying key trends and directions for the development of the industry, and applying the acquired knowledge to solve practical problems of prospecting, exploration, and production of minerals.

RO 2. Have a deep knowledge of the legislative framework and regulatory and technical documentation governing issues of operational production management, as well as master the methods and approaches to the application of these materials in practical activities.

RO 3. Have the ability to critically analyze and synthesize information to make informed decisions in research and management of production facilities, as well as conduct in-depth data analysis and develop independent scientific research based on modern methods of assessing and calculating mineral reserves.

RO 4. Analyze, systematize, and summarize geological documentation data, compile graphic materials characterizing the geological structure of the studied work area (diagrams, maps, sections, plans, diagrams), compile reports on the results of geological work and other summary documents (technical and economic reports, condition projects, etc.).

PO 5. Generate and test original scientific ideas using qualitative and quantitative methods of analysis, demonstrate high professional qualities and observe ethical standards in the geological fields.

RO 6. Engage in the practical implementation of production plans, including the development of design and estimate documentation, geological assignments and their stages, as well as the organization and liquidation of field work.

PO 7. Application of modern geological methods and technologies: interpretation of geophysical data, use of modeling software, geostatistical analysis, work with geographic information systems.

The following forms of examination are used to assess learning outcomes: written examination, practical examination (open questions, problem solving), and research work.

The final certification ends with the defense of the doctoral dissertation .

4. Passport of the educational program

4.1. General information

No.	Field name	Note
1	Code and classification of the field of education	8D07 Engineering, manufacturing and construction industries
2	Code and classification of training areas	8 D 072 Manufacturing and processing industries
3	Group of educational programs	D 121 - Geology
4	Name of the educational program	8D07215 - Geology and exploration of fossil fuels
5	Brief description of the educational program 8 D 07206 – Geology of Oil and Gas - Doctoral Studies	Training highly qualified research specialists in the field of oil and gas geology, capable of conducting fundamental and applied research, developing new methods for prospecting, exploration, and development of oil and gas fields. Deep understanding of geological processes: knowledge of

		theories of formation and evolution of oil and gas basins, methods of geological exploration and characteristics of oil and gas provinces. Experience in conducting scientific research: proficiency in field and laboratory research methods, analysis of geological data, geophysical and geochemical methods. Development and implementation of new technologies: the ability to develop and implement new technologies and methods for prospecting, exploration and development of oil and gas fields. Publication activity: the ability to publish research results in leading scientific journals and present them at international conferences. Teaching experience: ability to teach courses on oil and gas geology at universities.
6	The purpose of the OP	To train highly qualified specialists in fossil fuel geology who are capable of addressing current challenges in the geological industry and conducting scientific research, including developing software and new technologies, as well as methods for prospecting, exploration, and development of fossil fuel deposits.
7	Type of OP	New OP
8	Level according to the National Qualification Test	8
9	Level according to the ORK	8
10	Distinctive features of the OP	No
11	List of competencies of the educational program:	in the field of scientific and scientific-pedagogical activity in the context of rapid renewal and growth of information flows; in conducting theoretical and experimental scientific research; in setting and solving theoretical and applied problems in scientific research; in conducting a professional and comprehensive analysis of problems in the relevant field; in matters of interpersonal communication and human resources management; in matters of university training of specialists; in conducting examinations of scientific projects and research; in ensuring continuous professional growth.
12	Learning outcomes of the educational program:	PO 1. Study and critically evaluate advanced scientific achievements in the field of fossil fuel geology in the context of globalization and internationalization, identifying key trends and directions for the development of the industry, and applying the acquired knowledge to solve practical problems of prospecting, exploration, and production of minerals. RO 2. Have a deep knowledge of the legislative framework and regulatory and technical documentation governing issues of operational

		production management, as well as master the methods and approaches to the application of these materials in practical activities. RO 3. Have the ability to critically analyze and synthesize information to make informed decisions in research and management of production facilities, as well as conduct in-depth data analysis and develop independent scientific research based on modern methods of assessing and calculating mineral reserves. RO 4. Analyze, systematize, and summarize geological documentation data, compile graphic materials characterizing the geological structure of the studied work area (diagrams, maps, sections, plans, diagrams), compile reports on the results of geological work and other summary documents (technical and economic reports, condition projects, etc.). PO 5. Generate and test original scientific ideas using qualitative and quantitative methods of analysis, demonstrate high professional qualities and observe ethical standards in the geological fields. RO 6. Engage in the practical implementation of production plans, including the development of design and estimate documentation, geological assignments and their stages, as well as the organization and liquidation of field work. PO 7. Application of modern geological methods and technologies: interpretation of geophysical data, use of modeling software, geostatistical analysis, work with geographic information systems.
13	Form of study	daytime
14	Duration of study	3 g
15	Volume of loans	1 8 0
16	Languages of instruction	Russian, Kazakh, English
17	Awarded academic degree	Doctor of Philosophy (PhD)
18	Developer(s) and authors:	Ensepbaev Talgat Ablaevich Muratova Samal Karimbaevna Yeskozha Bazar Atashevich

4. 2 . Interrelation attainability generated results training By educational program And educational disciplines

No.	Name of the discipline	Brief description of the discipline	Cycle	Component	Loans	RO 1	RO 2	RO 3	RO 4	RO 5	RO 6	RO 7
1	LNG305 Academic writing	Objective: To develop academic writing skills and writing strategies in doctoral students in engineering and natural sciences. Contents: Fundamentals and general principles of academic writing, including: writing effective sentences and paragraphs; writing an abstract, introduction, conclusion, discussion, and summary; citing references; in-text citations; preventing plagiarism; and preparing a conference presentation.	BD	VK	5	+			+		+	+
2	MET322 Methods of scientific research	Objective: To acquire knowledge of the laws, principles, concepts, terminology, content, and specific features of the organization and management of scientific research using modern scientometric methods. Contents: the structure of technical sciences, the application of general scientific, philosophical, and specialized research methods, principles of research organization, methodological features of modern science, the development of science and scientific research, and the role of technical sciences, computer science, and engineering research in theory and practice.	BD	VK	5	+	+		+	+		+
3	MNG350 Sustainability Science	Objective: To develop in doctoral students a deep understanding of the interactions between natural and social systems, as well as skills in identifying and developing strategies for sustainable development that promote the long-term well-being of humanity and environmental conservation.	BD	KV	5	+		+	+		+	

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		Contents: To explore the complex interrelations between ecosystems and societies, as well as to delve into the analysis of sustainability issues at the local, national, and international levels.										
4	GEO347 Periodicity of sedimentation and the main stages of formation of oil and gas source formations	Brief Description of the Course Objective: Develop skills in sedimentation processes and sedimentary rock formation. Develop the ability to analyze geological data and interpret research results. Contents: Study of sedimentary material accumulation and transformation processes. Analysis of sedimentation cycles in time and space, identification of the causes and mechanisms of cyclicity. Main stages of formation: lithogenesis, diagenesis, metamorphism. Analysis of the influence of tectonics, climate, relief, and other factors on sedimentation processes and sedimentary rock formation. Paleogeography	BD	KV	5	+		+	+			+
5	GEO348 Tectonics and geodynamics of platforms and transition zones	Objective : To develop the ability to analyze geological data and interpret research results. To develop basic knowledge of the structure, evolution, and geodynamics of platforms and transition zones. Contents: Definition and classification of platforms. Tectonic structure, geodynamic evolution, types of platform structures. Tectonic structure and geodynamic processes in transition zones. Application of geodynamic models to understand the geological development of platforms and transition zones. Research methods. Creation of mathematical models of geodynamic processes.	B D	KV	5		+		+		+	+
6	GEO349 Regional geological	Objective : To develop the ability to analyze geological data and make decisions about the	PD	VK	5	+		+			+	+

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	work and selection of exploration directions	prospects of areas for mineral exploration. Contents: Methods of regional geological research. Stratigraphy and lithology of the sedimentary cover. Analysis and systematization of geological data to create geological maps and models. Principles for selecting and criteria for promising areas. Methods and stages of exploration. Reserve assessment and analysis of the profitability of deposit development.										
7	GEO350 Digital models of oil and gas systems and fossil fuel deposits	Objective : To develop the ability to create and analyze digital models of oil and gas systems and fossil fuel deposits. Contents: Principles and methods of digital modeling in geology. Various types of digital models. Creation of 3D models of oil, gas, coal, and other fossil fuel deposits. Integration of various geological data. Application of digital models. New technologies.	PD	VK	5	+		+	+			+

5. Curriculum of the educational program

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



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

WORKING CURRICULUM

Academic year	2025-2026 (Spring, Autumn)
Group of educational programs	D121 - "Geology"
Educational program	8D07215 - "Geology and exploration of fossil fuels"
The awarded academic degree	Doctor of Engineering (Industry)
Form and duration of study	full time (professional track) - 3 years

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	Lek/lab/pr Contact hours	in hours SIS (including TSIS)	Form of control	Allocation of face-to-face training based on courses and semesters						Prerequisites	
									1 course		2 course		3 course			
									1 sem	2 sem	3 sem	4 sem	5 sem	6 sem		
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)																
CYCLE OF BASIC DISCIPLINES (BD)																
M-1. Module of basic training (university component)																
MET322	Methods of scientific research		BD, UC	5	150	30/0/15	105	E		5						
LNG305	Academic writing		BD, UC	5	150	0/0/45	105	E		5						
GEO348	Tectonics and geodynamics of platforms and transition regions	1	BD, CCH	5	150	30/0/15	105	E		5						
GEO347	The frequency of sedimentation and the main stages of formation of oil and gas mining formations	1	BD, CCH	5	150	30/0/15	105	E		5						
MNG350	Sustainability Science	1	BD, CCH	5	150	30/0/15	105	E		5						
CYCLE OF PROFILE DISCIPLINES (PD)																
M-2. Module of professional activity (component of choice)																
GEO349	Regional geological work and the choice of areas of exploration		PD, UC	5	150	30/0/15	105	E		5						
GEO352	Digital models of fossil fuel deposit systems		PD, UC	5	150	30/0/15	105	E		5						
M-3. Practice-oriented module																
AAP371	Industrial internship		PD, UC	20				R	20							
M-4. Experimental research module																
AAP376	Experimental research work of doctoral student, including internships and doctoral dissertations		ERWDS	10				R	10							
AAP372	Experimental research work of doctoral student, including internships and doctoral dissertations		ERWDS	5				R		5						
AAP374	Experimental research work of doctoral student, including internships and doctoral dissertations		ERWDS	30				R			30					
AAP374	Experimental research work of doctoral student, including internships and doctoral dissertations		ERWDS	30				R				30				
AAP374	Experimental research work of doctoral student, including internships and doctoral dissertations		ERWDS	30				R					30			
AAP375	Experimental research work of doctoral student, including internships and doctoral dissertations		ERWDS	18				R							18	
ECA303	Writing and defending a doctoral dissertation		FA	12											12	
Total based on UNIVERSITY:										30	30	30	30	30	30	
										60		60		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	10	5	15
PD	Cycle of profile disciplines	0	30	0	30
Total for theoretical training:		0	40	5	45
ERWDS	Research Work of Doctoral Student				0
ERWDS	Experimental Research Work of Doctoral Student				123
FA	Final attestation				12

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TOTAL:				180
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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 28.12.2024

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	Asyeldkhan Y. .
Acting Department Chair - Hydrogeology, Engineering and Oil and Gas Geology	Akparbayev R. C.
Representative of the Academic Committee from Employees	Paragsulgov T. K.
____Acknowledged____	

