NCJS «KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY
named after K.I.SATBAYEV»

Institute of Geology and Oil and Gas Business named after K.Turyssov

Department of Petroleum Engineering

EDUCATIONAL PROGRAM

8D07210 «Innovative Technologies of the Oil & Gas Industry»

Code and classification of the field of education: 8D07 «Engineering, manufacturing and construction industries»
Code and classification of training areas: 8D072 «Industrial and manufacturing branches»
Group of educational programs: D115 «Oil engineering»
Level on NQF: 8
Level on SQF: 8
Period of study: 3
Volume of the credits: 180

Almaty 2025

Educational program 8D07210 «Innovative Technologies of the Oil & Gas Industry» approved at the meeting of the Academic Council of KazNRTU named after K.Satbayev.

Protocol no. 10 from 2025 y. " 03 " 06 .

Reviewed and recommended for approval at a meeting of the Educational and Methodological Council of KazNRTU named after K.Satbayev.

Protocol no. 3 from 2024 y. " 20 " 12 .

Educational program 8D07210 «Innovative Technologies of the Oil & Gas Industry» eveloped by the academic committee in the direction of 8D072 «Manufacturing and pricessing»

Full name	Academic degree/ academic title	Position, course	Place of work, contact.	Note
Chairperson of Academic Committee:				
Dias Abdimaulen	PhD	Head of the Department	NCJS «Kazakh National Research Technical University named after K.I.Satbayev»	
Teaching staff:				
Gulnaz Moldabayeva	Doctor of Technical Sciences, prof.	Professor	NCJS «Kazakh National Research Technical University named after K.I.Satbayev»	
Zaurbekov Seitzhan	Candidate of Technical Sciences	Professor	NCJS «Kazakh National Research Technical University named after K.I.Satbayev»	
Akhymbayeva Bibinur	PhD	Associate Professor	NCJS «Kazakh National Research Technical University named after K.I.Satbayev»	
Baimukhametov Murat	Candidate of Physical and Mathematical Sciences, docent	Associate Professor	NCJS «Kazakh National Research Technical University named after K.I.Satbayev»	

Moldabekov Murat	PhD	Associate Professor	NCJS «Kazakh National Research Technical University named after K.I.Satbayev»	
Smashov Nurlan	Candidate of Technical Sciences, docent	Associate Professor	NCJS «Kazakh National Research Technical University named after K.I.Satbayev»	
Imansakipova Nurgul	PhD	Associate Professor	NCJS «Kazakh National Research Technical University named after K.I.Satbayev»	
Yskak Ardak	PhD	Senior Lecturer	NCJS «Kazakh National Research Technical University named after K.I.Satbayev»	
Employers:				
Nurkas Zhasulan		Director	LLP «Manul»	
Bekbau Bakbergen	PhD	Leading Researcher, Modeling Service	«KMG Engineering» LLP	
Nysangaliyev Amangali	Doctor of Technical Sciences, Professor, Academician of the National Engineering Academy of the Republic of Kazakhstan	Director of the Center for Ground Design	JSC «Kazakh Institute of Oil and Gas»	
Students:				
Ibrayeva Korlan	Doctoral student in the educational program 8D07202 – "Petroleum Engineering"	2nd year	NCJS «Kazakh National Research Technical University named after K.I.Satbayev»	

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1. Description of the educational program

The main postgraduate education program (hereafter, the EP) for Ph.D. studies, administered by the Kazakh National Technical Research University, named after the K.I. Satpayev, approved by the Ministry of Education and Science of the Republic of Kazakhstan in the direction of "Petroleum Engineering," is a system of documents produced and approved taking into account the requirements of the labor market on the basis of the national higher education level.

The EP shall govern the priorities, expected outcomes, content, requirements and technology for the implementation of the educational process, the evaluation of the standard of graduate training in this field of training and shall include the curriculum, the work programs of the modules/disciplines, the practice programs and other materials to ensure quality education.

The curriculum of the 8D07210 "Innovative Technologies of the Oil and Gas Industry" educational program has been developed taking into account the curricula of the doctoral degree program of well-known research and engineering universities of the world, such as Colorado Schools of Mines, University of Lorraine. The curriculum is fully consistent with current trends in the development of science and technology used in the modern oil and gas industry.

Doctoral students undergo research internships at leading universities in the world: University of Pennsylvania, University of Texas, Colorado Schools of Mines, University of Lorraine, Universiti Teknologi Petronas.

At all levels of training, teaching is conducted by highly qualified teaching staff, including graduates from universities around the world and the Bolashak program.

Graduates can choose different career paths. They can start working directly at enterprises in leadership positions, or in research and higher education institutions.

The doctoral program in Petroleum Engineering is the second level of qualification in the three-tier higher education system, and it provides the basis for doctoral programs. The educational program 8D07210 "Innovative technologies of the oil and gas industry" was reviewed at a meeting of the Educational and Methodological Council of KazNTU named after K.I. Satpayev and approved at a meeting of the Academic Council of KazNTU named after K.I. Satpayev.

2. The purpose and objectives of the educational program

Purpose of the EP: To provide training for highly qualified specialized specialists in the field of the oil and gas industry, capable of solving complex engineering and scientific tasks, with in-depth knowledge and practical skills in the development and implementation of innovative technologies in the oil and gas sector. The program is aimed at developing the ability to conduct independent research, create new technologies and adapt them to modern industry requirements. The program focuses on the introduction of innovative and sustainable technologies

that take into account the environmental, social and economic aspects of the industry, in accordance with the International Sustainable Development Goals (SDGs).

The EP Objectives

1. To train specialists who will be able to apply the knowledge of mathematics, science and technology, as well as identify, formulate and solve engineering problems to improve the technological processes of the oil and gas industry.
2. To impart knowledge of research methodology to doctoral students (setting research goals, collecting data, processing and transforming data, examining data, building models and selecting methods, presenting and visualizing results)
3. Develop the ability to extract the necessary information from various sources, including information flows in real time, analyze it for further decision-making and see logical connections in the system of collected information.
4. Train doctoral students to effectively communicate information and thoughts to other people.
5. To instill in doctoral students the desire for independent learning and the manifestation of a high level of competence in engineering principles and practice.
6. To teach doctoral students the skills of working in different industry and multicultural teams.
7. To develop the graduates' need to live and practice ethical, social and environmental standards in their professions in a responsible manner.

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

1. The ability to apply advanced skills and knowledge to systematically study, evaluate and synthesize new complex concepts in order to answer important scientific questions in the field of petroleum engineering and improve existing knowledge or professional practice
2. To have an ability to study, develop/or transfer new knowledge and adapt best practices for the Kazakh oil and gas industry
3. To be able to dismantle the constant interest in creating new concepts /oil and gas technologies for a higher level of understanding of the teaching and learning process
4. Ability to conceptualize, design and execute independent research for the generation of new knowledge and applications and to make informed judgments on complex issues
5. Ability to participate in an oral and written form in professional discussions and oil and gas organizations, as well as publish original research results in international scientific journals
6. To be able to show personal involvement in the development of skills and career goals, independent initiative and ethical decision-making in professional

work in the oil and gas industry

4. Passport of the educational program

4.1. General information

№	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:	8D072 «Industrial and manufacturing branches»
3	Group of educational programs:	D115 «Oil Engineering»
4	Name of the educational program	8D07210 «Innovative Technologies of the Oil & Gas Industry»
5	Brief description of the educational program	The educational program «Innovative Technologies of the Oil & Gas Industry» is devoted to the formation of knowledge and skills of management activities, involving the creation of a strategy for the functioning and development of large institutional structures of the state-scale industry in the oil and gas industry. Develops planning ability, responsibility for the development and results of the processes of extraction, processing and sale of finished (final) petroleum products. The subjects of professional activity of the OP are deposits and enterprises engaged in the development and operation of oil and gas fields.
6	Purpose of the EP	To provide training for highly qualified specialized specialists in the field of the oil and gas industry, capable of solving complex engineering and scientific tasks, with in-depth knowledge and practical skills in the development and implementation of innovative technologies in the oil and gas sector. The program is aimed at developing the ability to conduct independent research, create new technologies and adapt them to modern industry requirements. The program focuses on the introduction of innovative and sustainable technologies that take into account the environmental, social and economic aspects of the industry, in accordance with the International Sustainable Development Goals (SDGs).
7	EP type	Innovative EP
8	Level on NQF	8
9	Level on SQF	8
10	Distinctive features of the EP	no
11	List of competencies of the educational program:	1.Apply advanced knowledge of geology and exploration of MPI in your professional and academic career. 2.Apply appropriate methods of analysis, both qualitative and quantitative, collect

		and integrate information in the best way and according to the standards of the geological and mining industry. 3. Demonstrate the skills of teaching in the bachelor's degree program, working with students, and leading them. 4. Conduct independent original research that contributes to the development of geological science and the industry, according to the best practices and standards of the industry. 5. Have written and oral communication skills, in a professional and ethical manner. 6. Demonstrate high professional qualities and ethics when interacting with various stakeholders.
12	Learning outcomes of the educational program:	1. Apply new techniques and technologies, improve production processes and labor organization 2. Develop and control design preparation of production, methods and technologies for creating innovative products/services in the industry 3. Integrate knowledge from various fields of science and technology to solve complex problems of the oil and gas industry 4. Apply modern methods of mathematical modeling, big data analysis and simulations to solve complex engineering problems in the oil and gas industry 5. Be able to track new trends and achievements in the field of oil and gas science and technology, adapt them to specific conditions and requirements
13	Form of training	Full -time
14	Period of study	3
15	Volume of the credits	180
16	Language of education	Kazakh, Russian, English
17	Degree to be conferred	Doctor of Engineering (Industry)
18	Developer and author:	PhD, Associate Professor Imansakipova Nurgul

4.2. The relationship between the achievability of the formed learning outcomes according to the educational program and academic disciplines

№	Name of the discipline	Brief description of the discipline	Number of credits	PO1	PO2	PO3	PO4	PO5
Cycle of basic disciplines University component								
1	Academic writing	Purpose: To form the system competencies of doctoral students and young researchers in the field of academic writing as a key tool for scientific communication and publication activities. Content: Scientific discourse and academic communication; Typology of scientific texts: from dissertation to publication; Creation of original scientific content; Scientific text: structure and logic of construction; Comparative analysis of sources and preparation of a literary review; Work with metadata and scientometric tools; Preparation of articles for international peer-reviewed journals; Work with reviews and the scientific community; Academic mobility and grant support for research; Annotations, patents, reports: science beyond the article; Planning of publication strategy and research career; English language of scientific communication.	5	v		v		
2	Methods of scientific research	Purpose: It consists in mastering knowledge about the laws, principles, concepts, terminology, content, specific features of the organization and management of scientific	5	v		v		

		research using modern methods of scientometry. Contents: structure of technical sciences, application of general scientific, philosophical and special methods of scientific research, principles of organization of scientific research, methodological features of modern science, ways of development of science and scientific research, the role of technical sciences, computer science and engineering research in theory and practice.						
Cycle of basic disciplines Component of choice								
1	Engineering design and operation of tank structures	Purpose: training in methods and technologies for designing various types of tank structures, including calculations for strength, stability and safety. Mastering skills in the operation of tank structures, including monitoring the condition and maintenance, monitoring the level and quality of the contents Contents: fundamentals of the design of tanks of various types, including steel, concrete and plastic structures, methods for calculating strength and stability, selection of materials considering chemical resistance and durability. The study of modern technologies in the operation of tanks, including maintenance, condition monitoring and compliance with industry regulations.	5		**v**		**v**	**v**
2	Sustainability Science	Objective: to develop a deep understanding among doctoral students of the interactions	5	**v**		**v**		

		between natural and social systems, as well as to develop skills for identifying and developing strategies for sustainable development that promote long-term human well-being and environmental preservation. Content: complex interconnections between ecosystems and societies, as well as an in-depth analysis of sustainability issues at local, national, and international levels.						
Cycle of profile disciplines University component								
1	Anticorrosion defence of oil and gas equipment	Purpose: To master the key principles of designing anticorrosive materials and methods of studying their properties. Content: as a result of studying the subject, doctoral students must master the methods and apply the principles of the corrosion process, materials science and engineering, surface analysis of materials for practical use; the ability to understand and apply basic concepts in the field of protecting materials from corrosion and preventing them from destruction, based on an integrated analysis of modern knowledge about corrosion, solve applied problems, understand the basic technical concepts in this application area.	5		**v**	**v**	**v**	
2	Applied geoengineering and technologies of secondary hydrocarbon production	Purpose: to study and master the specialized knowledge and skills necessary for the effective use of geoengineering methods and technologies in the process of secondary hydrocarbon production. Contents: fundamentals of geophysics, hydrodynamic processes in the reservoir, technologies for	5			**v**	**v**	**v**

		increasing well productivity, geoengineering methods for improving hydrocarbon extraction, as well as solving linear and radial diffusion equations.						
3	Production practice	The Production practice is conducted in order to consolidate the theoretical knowledge gained in the learning process, acquire practical skills, competencies and professional experience in the Master's degree program being taught, as well as to master best practices.	20	v				v

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

SATBAYEV UNIVERSITY

«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	**D115 - "Oil engineering"**
Educational program	**8D07210 - "Innovative Technologies of the Oil & Gas Industry"**
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															
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						
PET309	Engineering design and operation of tank structures	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															
PET308	Applied geoengineering and technologies of secondary hydrocarbon production		PD, UC	5	150	30/0/15	105	E	5						
PET310	Anticorrosion defence of oil and gas equipment		PD, UC	5	150	30/0/15	105	E	5						
M-3. Practice-oriented module															
AAP371	Industrial intership		PD, UC	20				R		20					
M-4. Experimental research module															
AAP372	Experimental research work of doctoral student, including internships and doctoral dissertations		ERWDS	5				R	5						
AAP376	Experimental research work of doctoral student, including internships and doctoral dissertations		ERWDS	10				R		10					
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	
M-5. Module of final attestation															
ECA325	Final examination (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**
RWDS	Research Work of Doctoral Student				0
ERWDS	Experimental Research Work of Doctoral Student				123
FA	Final attestation				12

TOTAL:				**180**

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. Б.
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. .
Department Chair - Petroleum Engineering	Akhymbayeva B. .
Representative of the Academic Committee from Employers ____Acknowledged____	Nysangaliev A.