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

8D07202 «Petroleum engineering»

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 8D07202 «Petroleum Engineering» 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 8D07202 «Petroleum Engineering» 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 8D07202 Petroleum Engineering educational program is aimed at training doctoral students who gain in-depth knowledge in their field and master a variety of scientific research methods.

The educational program is designed to train specialists in the field of development and operation of oil and gas fields, drilling, transportation and storage of hydrocarbons. They conduct their own research, write dissertations, and contribute to the academic community with their discoveries. In addition, doctoral studies contribute to the development of innovation activities.

The curriculum of the 8D07202 Petroleum Engineering educational program has been developed taking into account the curricula of the doctoral degree program at renowned research and engineering universities around the world, such as the Colorado Schools of Mines and the 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. The OP is based on the state educational standard for higher professional education; on the professional standard. The professional standard for this educational program:

1. Professional standard: Teacher (faculty) of higher and (or) postgraduate education organizations

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.

The Master's degree 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 8D07202 "Petroleum Engineering" was reviewed at a meeting of the Educational and Methodological Council of KazNRTU named after K.I. Satpayev and approved at a meeting of the Academic Council of KazNRTU named after K.I. Satpayev.

2. The purpose and objectives of the educational program

Purpose of the EP: Training of highly qualified specialists with research training, with core competencies in solving scientific, organizational and production tasks in the implementation of innovative projects in the field of petroleum engineering, as well as focused on the introduction of innovative and sustainable technologies that take into account the environmental, social and economic aspects of the industry, in accordance with international sustainable Development Goals.

The EP Objectives

1. To train specialists who will be able to apply 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	8D07202 «Petroleum Engineering»
5	Brief description of the educational program	The educational program "Petroleum Engineering" 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	Training of highly qualified specialists with research training, with core competencies in solving scientific, organizational and production tasks in the implementation of innovative projects in the field of petroleum engineering, as well as focused on the introduction of innovative and sustainable technologies that take into account the environmental, social and economic aspects of the industry, in accordance with international sustainable Development Goals.
7	EP type	New 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. To plan and conduct independent research to generate new knowledge and applications and make informed judgments on complex issues 2. To apply advanced skills and knowledge to systematically explore, evaluate and synthesize complex new concepts to answer important scientific questions in the field of petroleum engineering and improve existing knowledge or professional practice 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. 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 5. To develop/ or transfer new knowledge and adapt best practices for the Kazakh oil and gas industry 6. To participate orally and in writing in professional discussions and oil and gas communities, as well as publish original research results in international scientific journals
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 Philosophy PhD
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	PO6
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		v
2	Methods of scientific research	Purpose: It consists in mastering	5			v	v	v	v

		knowledge about the laws, principles, concepts, terminology, content, specific features of the organization and management of scientific 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	Petroleum Reservoir Simulation: Compositional model	The purpose of the discipline "Reservoir Modeling: Compositional Model" is to teach students the principles and methods of composite modeling of oil and gas reservoirs. The course is aimed at developing the ability to use composite models to analyze and predict the phase behavior of hydrocarbons in reservoir conditions, which is critical for the effective development of fields with complex fluids. Students will learn to model the distribution of oil and gas components in a reservoir, evaluate changes in fluid composition	5		**v**		**v**		

		depending on pressure and temperature, and use this data to optimize production processes and reservoir management. Content: The Reservoir Modeling: Compositional Model course explores composite models for detailed analysis of the behavior of hydrocarbon fluids in oil and gas reservoirs. During the course, students master: Fundamentals of composite models, including the theory and practice of modeling changes in fluid composition depending on temperature, pressure and other reservoir conditions. Application of mathematical and physicochemical methods to predict the phase behavior of hydrocarbons in a multiphase system. Use of modeling and data analysis software to assist in production optimization and field development. Solving practical problems using examples of real oil and gas projects, deepening students' understanding of complex processes in reservoirs.							
2	Sustainability Science	Objective: to develop a deep understanding among doctoral students of the interactions 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	5			**v**	**v**	**v**	**v**

		between ecosystems and societies. An analysis of sustainability issues at local, national, and international levels.							
3	Advanced Drilling Fluids	Purpose: to form a holistic and expanded knowledge about the functions and properties of drilling fluids on various bases in the production of hydrocarbons. Content: the discipline is designed to form a system of knowledge about the technology of reservoir opening, about loss of circulation and problems of pipe snapping, and their solutions, about well cleaning, hydraulic calculations, measurements of drilling mud properties in laboratory conditions and in real time on drilling rigs. The course contains the design and control and adjustment of drilling mud parameters to achieve drilling objectives in a safe and effective way.	5	v	v		v		
Cycle of profile disciplines Component of choice									
1	Applied well testing	Purpose: To form students' knowledge of the basic principles of well exploration, as well as the application of this knowledge in solving various tasks. Content: This course is designed to enhance students' self-study skills. Therefore, students should consciously allocate enough time and energy to read, understand, and apply knowledge and skills in the classroom.	5		v	v		v	

2	Advanced Production Engineering	Purpose: To promote the development of scientific and technical thinking and the acquisition by students of the necessary knowledge and practical skills in the field of oil well operation to optimize oil production processes. Content: The course will cover the principle and application of various theories and methods necessary to design, evaluate and maximize mining efficiency in a cost-effective manner. Attempts will be made to understand how these methods can be applied in a practical field development project in order to determine the best way to use oil reserves, as well as maximize final production.	5	v				v	
3	Advanced well completion	Purpose: study of technological operations for completing the construction of a well before putting it into operation, a set of works including opening up a productive formation by drilling, testing promising horizons, fastening the well with casing pipes, disconnecting permeable horizons from each other, secondary opening of the productive formation by perforation, testing and completion of the well. Contents: The discipline contains topics on the initial opening of a productive formation; hydrodynamic improvement of penetration, testing of formations in an open hole; on the	5	v	v				

		principles of well design; well cementing technologies; secondary opening of the productive formation; organization and technology of well development.							
4	Advanced Gas Engineering	Purpose: To familiarize undergraduates with current technological trends in the development and production of gas, the formation of skills related to research and production activities in the field of operation of oil and gas wells under the influence of complicating factors. Content: Students will get acquainted with modern methods of determining the properties of gas, the specifics of the operation of gas wells, the technological parameters of gas movement from the reservoir to the consumer, methods of creating and operating underground gas storage facilities.	5	**v**				**v**	
Cycle of profile disciplines University component									
1	Pedagogical practice	Pedagogical practice is a component of professional training for scientific and pedagogical activity in and represents a type of practical activity of doctoral students in the implementation of the educational process at the university., including the teaching of special disciplines, the organization of educational activities of students, scientific and methodological work on	10			**v**	**v**		**v**

		the subject, obtaining skills and practical teaching skills.							
2	Research practice	The research practice is a part of the research work of the doctoral program, which also includes the research work in the semester and the preparation of a doctoral dissertation	10			**v**	**v**	**v**	**v**

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"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	**8D07202 - "Petroleum Engineering"**
The awarded academic degree	**Doctor of Philosophy PhD**
Form and duration of study	**full time (scientific and pedagogical 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						
PET303	Advanced Drilling Fluids	1	BD, CCH	5	150	30/0/15	105	E	5						
PET305	Petroleum Reservoir Simulation: Compositional model	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						
M-3. Practice-oriented module															
AAP350	Pedagogical practice		BD, UC	10				R		10					
CYCLE OF PROFILE DISCIPLINES (PD)															
M-2. Module of professional activity															
PET301	Advanced well completion	1	PD, CCH	5	150	30/0/15	105	E	5						
PET307	Advanced gas engineering	1	PD, CCH	5	150	30/0/15	105	E	5						
PET304	Applied well testing	2	PD, CCH	5	150	30/0/15	105	E	5						
PET306	Advanced Production Engineering	2	PD, CCH	5	150	30/0/15	105	E	5						
M-3. Practice-oriented module															
AAP355	Research practice		PD, UC	10				R			10				
M-4. Experimental research module															
AAP336	Research work of the doctoral student, including internships and doctoral dissertation		RWDS	5				R	5						
AAP347	Research work of the doctoral student, including internships and doctoral dissertation		RWDS	20				R		20					
AAP347	Research work of the doctoral student, including internships and doctoral dissertation		RWDS	20				R			20				
AAP356	Research work of the doctoral student, including internships and doctoral dissertation		RWDS	30				R				30			
AAP356	Research work of the doctoral student, including internships and doctoral dissertation		RWDS	30				R					30		
AAP348	Research work of the doctoral student, including internships and doctoral dissertation		RWDS	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	20	5	25
PD	Cycle of profile disciplines	0	10	10	20
Total for theoretical training:		**0**	**30**	**15**	**45**
RWDS	Research Work of Doctoral Student				123
ERWDS	Experimental Research Work of Doctoral Student				0
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.