



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

Department of Petroleum Engineering

EDUCATIONAL PROGRAM

8D07202 «Petroleum engineering»

Code and classification of the field of education: 8D07 «Engineering, Manufacturing and Civil engineering»

Code and classification of training areas: 8D072 «Manufacturing and processing»

Group of educational programs: D115 «Petroleum engineering»

Level on NQF: 8

Level on SQF: 8

Period of study: 3

Volume of the credits: 180

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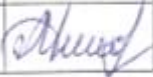
Educational program 8D07202 – «Petroleum Engineering» approved at the meeting of the Academic Council of KazNRTU named after K.I.Satpayev.

Protocol no. 3 from 2022 y. " 17 " 10 .

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

Protocol no. 2 from 2021 y. " 22 " 10 .

Educational program 8D07202 - «Petroleum Engineering» developed by the academic committee in the direction of 8D072 – «Manufacturing and processing»

Full name	Academic degree/ academic title	Position, course	Place of work, contact.	Note
Chairperson of Academic Committee:				
Yeligbaeva Gulzhakhan	Doctor of Chemical Sciences, Professor	Head of the Department	NCJS «Kazakh National Research Technical University named after K.I.Satbayev»	
Teaching staff:				
Abdeli Dairabay	Doctor of Technical Sciences, Professor	Professor	NCJS «Kazakh National Research Technical University named after K.I.Satbayev»	
Gulnaz Moldabayeva	Doctor of Technical Sciences, prof.	Professor	NCJS «Kazakh National Research Technical University named after K.I.Satbayev»	
Baymukhametov 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	

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			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	Senior Lecturer	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:				
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»	
Bekbauov Bakbergen	PhD	Leading Researcher, Modeling Service	«KMG Engineering» LLP	
Nurkas Zhasulan		Director	LLP «Manul»	

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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 development and management of the Postgraduate Education Program "Petroleum Engineering" shall be carried out in accordance with the standard and working curriculum for the terminated specialty 6D070800 "Oil and Gas Engineering" established by the Kazakh National Research Technical University named after Satpaev and approved in the prescribed manner.

The educational program submitted for accreditation complies with the criteria of the State Level for Postgraduate Education. The implementation of the educational program and the plan for its creation is carried out by the Department of Petroleum Engineering of the Institute of Geology, Petroleum and Mining Engineering named after K. Turysov.

The key aim of the program is the development of general cultural competencies of graduates (competencies of social interaction, self-organization and self-government, of a hierarchical nature of activity), the implementation of a competency-based approach to the formation of general cultural competencies of graduates should be ensured by a combination of educational and extracurricular work; the requisite socio-cultural environment;

The formation of the general technical and professional competence of the graduates.

The PhD program is an educational research work that involves in-depth theoretical and (or) experimental and practical research in the field of fundamental and (or) applied science.

2. The purpose and objectives of the educational program

Purpose of the EP: Training of highly qualified specialists with fundamental educational, methodological and research skills; having basic competencies in the field of solving scientific and organizational and production tasks in the implementation of innovative projects in the field of petroleum engineering; having the skills of project activity, the use of modern computer technologies, entrepreneurship and social responsibility in solving problems of the oil and gas

industry; owning the technology of communicative communication and leadership in scientific, industrial and educational spheres.

The EP Objectives

- in-depth research and interpretation of the theoretical and methodological foundations used to examine the topical problems of the related branch of science in the profile of the scientific field;
- training skills for independent study, technical and teaching activities;
- develop the capacity, through original scientific research, to contribute to the advancement of the latest developments in science in the corresponding branch of the country and the world;
- ensure the acceptance of doctoral students in the international educational and scientific community and in the labor market;
- create the capacity to build, conceptualize and execute projects aimed at generating new knowledge of significant scientific significance in the field of fuel energy.

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 Civil engineering»
2	Code and classification of training areas:	8D072 «Manufacturing and processing»
3	Group of educational programs:	D115 «Petroleum 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 fundamental educational, methodological and research skills; having basic competencies in the field of solving scientific and organizational and production tasks in the implementation of innovative projects in the field of petroleum engineering; having the skills of project activity, the use of modern computer technologies, entrepreneurship and social responsibility in solving problems of the oil and gas industry; owning the technology of communicative communication and leadership in scientific, industrial and educational spheres.
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

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		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:	<ol style="list-style-type: none"> 1. Ability to conceptualize, design and execute independent research for the generation of new knowledge and applications and to make informed judgments on complex issues 2. 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 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 have an ability to study, develop/or transfer new knowledge and adapt best practices for the Kazakh oil and gas industry 6. 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
13	Form of training	Full -time
14	Period of study	3
15	Volume of the credits	180
16	Language of education	Kazakh, Russian
17	Degree to be conferred	Doctor PhD
18	Developer and author:	Yeligbayeva G.Zh.

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	The course is aimed at developing academic writing skills and writing strategies for doctoral students in the field of engineering and natural sciences. The course focuses on the basics and general principles of academic writing for; writing effective sentences and paragraphs; using tenses in scientific literature, as well as styles and punctuation; writing abstracts, introductions, conclusions, discussions, conclusions, literature and resources used; quoting in the text; preventing plagiarism, and making presentations at a conference.	5			v	v		v
2	Scientific research methods	The concept of science and scientific research, methods and methodology of scientific research, methods of collecting and processing scientific data, principles of organizing scientific research, methodological features of modern science, ways of developing science and scientific research, the role of technical sciences, informatics and engineering research in modern	5			v	v	v	v

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		science, the structure of technical sciences, the use of general scientific, philosophical and special methods scientific research in theory and practice.							
Cycle of basic disciplines									
Component of choice									
1	Petroleum Reservoir Simulation: Compositional model	This course examines numerical modeling of an oil and gas reservoir using state equations such as Peng-Robinson, Redlich-Kwong, and multi-component flow equations for secondary and tertiary oil and gas production. Topics include: viscosity and density models, relative permeability graphs, capillary pressure, and examples of gas and chemical injection for enhanced oil recovery.	5		v		v		
2	Advanced Drilling Fluids	This course covers advanced knowledge about the functions and properties of drilling fluids on various bases and intended for opening the reservoir, as well as about the loss of circulation and problems of pipe snapping, and their solutions, about well cleaning, hydraulic calculations, measurements of drilling fluid properties in laboratory conditions and in real time on drilling rigs. In addition, the course will allow students to design, control and adjust the parameters of drilling mud to achieve drilling goals in a safe and effective way.	5	v	v		v		

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Cycle of profile disciplines									
Component of choice									
1	Applied well testing	This discipline covers the basic concepts of well test analysis, analytical and graphical methods of interpreting well test data. In addition, this course reflects the typical analysis of curves, nodal analysis and hydraulic fracturing wells	5		v	v		v	
2	Advanced Production Engineering	This course covers inflow performance relationships (IPR) and multiphase pipe flow and constraints analysis using flow correlations. Prediction of the flow structure for vertical, horizontal, and inclined pipes is considered. Analysis and optimization of all oil production systems using conventional and nodal analysis.	5	v				v	
3	Advanced well completion	This course covers the basics of advanced well completion technologies, including intelligent wells and autonomous inflow monitoring devices. The course will allow you to study various types of advanced completion and appropriate programs for technology. Students will be introduced to petroleum engineering developments for advanced well completion programs, such as project evaluation, well performance modeling, and reservoir modeling. This course will introduce you to the methods and workflows by which you	5	v	v				

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		can select the appropriate advanced completion technology.							
4	Advanced Gas Engineering	The purpose of this course is the practical use of basic methods for determining the basic properties of natural gas, processing the results of studies of gas wells, calculations of technological modes of operation of gas wells, calculation of gas reserves, calculation of the main parameters of well operation; performing experiments on the study of wells. Course content: The study of gas wells, the principles of designing the development of gas fields, Complications during the operation of gas and gas condensate wells, Ways to increase the productivity of wells, Purposes and types of underground gas storage. The types of designing the development of gas and gas condensate fields, the processing of well research data, the choice of a rational option for the development of deposits, the selection of equipment and the establishment of the optimal mode of operation of wells taking into account complicating factors, the choice of methods of influencing the bottom-hole zone of wells, the selection of equipment and pipelines in the collection and preparation processes are considered	5	v				v	
Cycle of profile disciplines University component									

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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 the subject, obtaining skills and practical teaching skills.	10			v	v		v
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



CURRICULUM
of Educational Program on enrollment for 2023-2024 academic year
Education program "8D07202-Petroleum Engineering"
Group of educational programs D115- "Petroleum Engineering"

Form of study: full-time Duration of study: 3 year Academic degree: Doctor of Philosophy (PhD)

Discipline code	Name of disciplines	Cycle	Total amount in credits	Total hours	Classroom amount lec/lab/pr	SIS (including TSIS) in hours	Form of control	Allocation of face-to-face training based on courses and semesters					
								1 course		2 course		3 course	
								1 semester	2 semester	3 semester	4 semester	5 semester	6 semester
CYCLE OF BASIC DISCIPLINES (BD)													
M-1. Module of basic training (university component)													
MET322	Scientific research methods	BD UC	5	150	2/0/1	105	E	5					
LNG305	Academic writing	BD UC	5	150	0/0/3	105	E	5					
component of choice													
PET303	Advanced Drilling Fluids	BD CCHBD CCH	5	150	2/0/1	105	E	5					
PET305	Petroleum Reservoir Simulation: Compositional model			150	2/0/1	105							
CYCLE OF PROFILE DISCIPLINES (PD)													
M-2. Module of professional activity (component of choice)													
PET301	Advanced well completion	PD, CCH	5	150	2/0/1	105	E	5					
PET307	Advanced Gas Engineering			150	2/0/1	105							
PET304	Applied Well Testing	PD, CCH	5	150	2/0/1	105	E	5					
PET306	Advanced Production Engineering			150	2/0/1	105							
M-3. Practice-oriented module													
AAP350	Pedagogical practice	BD UC	10						10				
AAP355	Research practice	PD UC	10							10			
M-4. Experimental research module													
AAP336	Research work of a doctoral candidate, including internships and completion of a doctoral dissertation	RWDS UC	5						5				
AAP347	Research work of a doctoral candidate, including internships and completion of a doctoral dissertation	RWDS UC	40							20	20		
AAP356	Research work of a doctoral candidate, including internships and completion of a doctoral dissertation	RWDS UC	60								30	30	
AAP348	Research work of a doctoral candidate, including internships and completion of a doctoral dissertation	RWDS UC	18										18
M-5. Module of final attestation													
ECA303	Writing and defending a doctoral dissertation	FA	12										12
Total based on UNIVERSITY:								30	30	30	30	30	30
								60	60	60	60	60	

Number of credits for the entire period of study					
Cycle code	Cycles of disciplines	Credits			Total
		university component (UC)	component of choice (CCH)		
BD	Cycle of basic disciplines	20	5		25
PD	Cycle of profile disciplines	10	10		20
	Total for theoretical training:	0	30	15	45
	RWDS				123
FA	Final attestation	12			12
	TOTAL:	12	30	15	180

Decision of the Academic Council of Kazntu named after K.Satpayev. Protocol № 3 от 27 "10" 2022 г.

Decision of the Educational and Methodological Council of Kazntu named after K.Satpayev. Protocol № 2 от 21 "10" 2022 г.

Decision of the Academic Council of the Institute _____, Protocol № 2 от 14 "10" 2022 г.

Vice-Rector for Academic Affairs: [Signature] B.A.Zhautikov

Institute Director: [Signature] A.Kh.Sydykov

Department Head: [Signature] G.Zh.Yelighayeva

Specialty Council from employers: [Signature] A.N.Nysangaliyev