Institute of Geology, Oil and Mining named after K. Turysov

Petroleum Engineering Department

EDUCATIONAL PROGRAM

6B07126 Transmission networks and infrastructure

Code and classification of field of education: 6B07 Engineering, Manufacturing and Civil engineering
Code and classification of direction of personnel training : 6B071 Engineering and engineering trades
Group of educational programs: B165 Transmission system and infrastructure
Level on NQF: 6
Level on SQF: 6
Period of study: 4
Volume of the credits: 240

Алматы 2023

Educational program 6B07126 Transmission networks and infrastructure
code and name of the educational program
was approved at a meeting of the Academic Council of KazNRTU named after K.I. Satpayev.
Protocol № 5 « 24 » November 2022 .

Considered and recommended for approval at a meeting of the Educational and Methodological Council of KazNRTU named after K.I. Satpayev.
Protocol № 3 « 17 » November 2022 .

Educational program 6B07126 Transmission networks and infrastructure
code and name of the educational program
was developed by the academic committee in the field of Petroleum Engineering.

FULL NAME	Academic degree/ academic title	Job title	Place of work	Signature
Chairman of the Academic Committee:				
Yeligbayeva Gulzhakhan Zhakparovna	Doctor of Chemical Scienses, professor	Head of Department	NJSC «Kazakh National Research Technical University named after K.I. Satpayev	
Professorial- teaching staff:				
Abdeli D.Zh.	Doctor of technical sciences, professor	Professor	NJSC «Kazakh National Research Technical University named after K.I. Satpayev»	
Baimukhametov M.A.	Candidate of physical and mathematical sciences, associate professor	Assistant Professor	NJSC «Kazakh National Research Technical University named after K.I. Satpayev»	
Moldabayeva G.Zh.	Doctor of technical sciences, Professor	Professor	NJSC «Kazakh National Research Technical University named after K.I. Satpayev»	
Moldakhmetova D.E.	-	Senior teacher	NJSC «Kazakh National Research Technical University named after K.I. Satpayev»	
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Employers:				
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Students				
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1. Description of the educational program

The educational program (hereinafter, EP) is a set of documents developed by the Kazakh National Research Technical University named after K.I. Satpayev and approved by the Ministry of Education and Science of the Republic of Kazakhstan. The EP takes into account the needs of the labor market, the requirements of economic sectors and is based on the state educational standard for higher professional education in the relevant field.

The EP determines program educational goals, student learning outcomes, necessary conditions, content and technologies for the implementation of the educational process, assessment and analysis of the quality of students during training and after graduation.

The EP includes the curriculum, discipline content, learning outcomes, and other materials to ensure quality education for students.

2. Purpose and objectives of the educational program

EP purpose: The purpose of the educational program is to train specialists who are in demand in the oil and gas industry, who have the necessary basic competencies in the field of design and operation of main pipelines and oil and gas storage facilities.

EP objectives:

- assisting students, teachers and industry experts in understanding the structure of the educational process;
- demonstration of the formation of the necessary core competencies after completion of the undergraduate program by students;
- establishing a common framework for the feasibility and necessity of the Backbone Networks and Infrastructure training program for all stakeholders, both public and private.

3. Requirements for assessing learning outcomes of an educational program

1. Is able to apply purposefully basic knowledge in the field of mathematical, natural, humanitarian and economic sciences in professional activities
2. Is able to use modern equipment, use information technologies in the field of professional activity
3. Having the skills of designing and conducting experiments, is able to analyze and interpret experimental data
4. Able to communicate in business state, Russian and foreign languages; apply the basics of the legal system and legislation of the Republic of Kazakhstan and international experience in the oil and gas field; use the basic patterns and regulatory forms of interpersonal and partnership relations
5. Able to participate in the installation and commissioning during testing and commissioning of new technological equipment. He is able to check the technical condition and the residual resource of technological equipment, to

carry out equipment diagnostics

6. Has basic knowledge in the field of design and operation of oil storage facilities and pipelines, contributing to the formation of a professional with a broad outlook.
7. Is able to combine theory and practice of solving design and engineering problems; is able to independently identify, formulate and solve technical problems
8. Understands the impact of technical solutions in the global, economic, environmental and social context; uses methods, skills and modern engineering tools necessary for professional practice
9. Understands modern technical and economic problems; has the skills to independently obtain information about modern engineering achievements and their application in practice
10. Is able to apply the achievements of science and technology of the oil and gas industry to solve engineering, environmental and economic problems that have arisen in the course of professional activity
11. Has the skills to read normative, estimate, design and technical documentation and standards, is able to independently develop technical documentation

4. Passport of the educational program

4.1. General information

№	Field name	Note
1	Code and classification of field of education:	6B07 Engineering, Manufacturing and Civil engineering
2	Code and classification of direction of personnel training : 6B071 Engineering and engineering trades	6B071 Engineering and engineering trades
3	Group of educational programs:	B165 Transmission system and infrastructure
4	Name of educational program	6B07126 Transmission networks and infrastructure
5	Brief description of the educational program	The educational program (hereinafter, EP) is a set of documents developed by the Kazakh National Research Technical University named after K.I. Satpayev and approved by the Ministry of Education and Science of the Republic of Kazakhstan. The EP takes into account the needs of the labor market, the requirements of economic sectors and is based on the state educational standard for higher professional education in the relevant field. The EP determines program educational goals, student learning outcomes, necessary conditions, content and technologies for the

		implementation of the educational process, assessment and analysis of the quality of students during training and after graduation. The EP includes the curriculum, discipline content, learning outcomes, and other materials to ensure quality education for students.
6	EP purpose	The purpose of the educational program is to train specialists who are in demand in the oil and gas industry, who have the necessary basic competencies in the field of design and operation of main pipelines and oil and gas storage facilities.
7	EP type	New EP
8	Level on NQF	6
9	Level on SQF	6
10	Distinctive features of the EP	The EP was developed in partnership with the Industrial Advisory Council, which includes global energy companies - Chevron, Eni and Shell, as well as together with the academic partner Colorado School of Mines (USA) for training highly qualified personnel for the oil and gas industry.
11	List of competencies of the educational program:	- professional; - general engineering; - computer engineering; - engineering and working; - socio-economic competencies
12	Educational program learning outcomes:	11
13	Form of training	Full time
14	Period of study	4
15	Volume of the credits	240
16	Language of education	Kazakh, Russian, English
17	Academic degree awarded:	Bachelor of Engineering and Technology
18	Developer(s) and authors:	G.Zh.Yeligbayeva

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

№	Name of discipline	Short description of discipline	Amount of credits	The formed educational outcomes										
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
Cycle of general education disciplines Required component														
1	Foreign language	English is a compulsary subject. According to the results of placement test or IELTS score, students are placed into groups and disciplines. The name of the discipline corresponds to the level of English. When passing from level to level, prerequisites and postrequisites are respected.	10				v		v	v	v			
2	Kazakh (Russian) language	Kazakh (Russian) language In this course author considers socio-political, socio-cultural spheres of communication and functional styles of the modern kazakh (russian) language. The course covers the specifics of the scientific style to develop and activate professional communication skills and abilities of students. Also it allows students to leavn the basics of scientific style practically and develop the	10				v		v		v	v		

		ability of production structural and semantic text analysis.												
3	Physical Culture	The purpose of the discipline is to master the forms and methods of forming a healthy lifestyle within the framework of the professional education system. Familiarization with the natural-scientific basics of physical education, knowledge of modern health-improving technologies, basic methods of independent physical education and sports. As part of the course, the student will master the rules of judging in all sports.	8				v		v		v		v	v
4	Information and Communication technology (in English)	The aim of the course is to gain theoretical knowledge in information processing, the latest information technologies, local and global networks, the methods of information protection; Getting the right use of text editor editors and tabulators; creation of base and different categories of applications.	5				v		v	v	v			
5	History of Kazakhstan	The purpose of the discipline is to provide objective historical knowledge about the main stages of the history of Kazakhstan from ancient times to the present day; introduce	5				v		v	v	v			

		students to the problems of the formation and development of statehood and historical and cultural processes; contribute to the formation of humanistic values and patriotic feelings in the student; teach the student to use the acquired historical knowledge in educational, professional and everyday life; evaluate the role of Kazakhstan in world history.												
6	Philosophy	The purpose of the discipline is to teach students the theoretical foundations of philosophy as a way of knowing and spiritually mastering the world; developing their interest in fundamental knowledge, stimulating the need for philosophical assessments of historical events and facts of reality, assimilating the idea of the unity of the world historical and cultural process while recognizing the diversity of their skills in applying philosophical and general scientific methods in professional activities.	5				v		v		v		v	
7	Module of socio-political knowledge (sociology, political science)	The objectives of the disciplines are to provide students with explanations on the sociological analysis of	3		v				v	v				

		society, about social communities and personality, factors and patterns of social development, forms of interaction, types and directions of social processes, forms of regulation of social behavior, as well as primary political knowledge that will serve as a theoretical basis for understanding social -political processes, for the formation of political culture, development of a personal position and a clearer understanding of the extent of one's responsibility; help to master the political, legal, moral, ethical and socio-cultural norms necessary to act in the interests of society, form personal responsibility and achieve personal success.												
8	Module of socio-political knowledge (cultural studies, psychology)	The purpose of the disciplines is to study the real processes of cultural creative activity of people who create material and spiritual values, identify the main trends and patterns of cultural development, changes in cultural eras, methods and styles, their role in the formation of man and the development of society, as well as master psychological	5							**v**	**v**	**v**	**v**	

		knowledge for the effective organization of interpersonal interaction, social adaptation in the field of their professional activities.												
Cycle of general education disciplines Election Component														
1	Fundamentals of anti-corruption culture and law	The course introduces students to the improvement of socio-economic relations of Kazakhstan society, psychological features of corrupt behavior. Special attention is paid to the formation of an anti-corruption culture, legal responsibility for acts of corruption in various spheres. The purpose of studying the discipline «Fundamentals of anti-corruption culture and law» is to increase public and individual legal awareness and legal culture of students, as well as the formation of a knowledge system and a civic position on combating corruption as an antisocial phenomenon. Expected results: to realize the values of moral consciousness and follow moral norms in everyday practice; to work on improving the level of moral and legal culture; to use spiritual and moral mechanisms to prevent corruption.	5				v		v		v			
2	Fundamentals of scientific research methods	Introduction. Science and scientific thinking. Basic concepts. The main categories of science. Science as a system of knowledge. Fact, hypothesis, theory, con-cept. Methodology, method, methodology. Scientific research. Technology of research work. Stages of scientific research. Technology of working with	5				v		v					

		sci-entific literature. Presentation of research results. System approach, system thinking, system analysis. General logical methods of research. Organization of scientific activity and scientific re-search. Implementation of the results of scientific research. Economic effi-ciency of scientific research.											
3	Fundamentals of economics and entrepreneurship	Discipline studies the foundations of economics and entrepreneurial activity from the point of view of science and law; features, problematic aspects and development prospects; the theory and practice of entrepreneurship as a system of economic and organizational relations of business structures; The readiness of entrepreneurs for innovative susceptibility. The discipline reveals the content of entrepreneurial activity, the stages of career, qualities, competencies and responsibility of the entrepreneur, theoretical and practical business planning and economic examination of business ideas, as well as the analysis of the risks of innovative development, the introduction of new technologies and technological solutions.	5				v		v		v			
4	Ecology and life safety	The discipline studies the tasks of ecology as a science, environmental terms, the laws of the functioning of natural systems and aspects of environmental safety in the conditions of labor activity. Monitoring of the environment and management in the field of its safety. Sources of pollution of atmospheric air, surface, groundwater, soil and ways to solve environmental	5								v		v	

		problems; life safety in the technosphere; natural and man-made emergencies												
Cycle of basic disciplines University component														
1	Introduction to major	Introduction to basic concepts of petroleum engineering, including drilling and completion of wells, petroleum reservoir engineering, production engineering, surface gathering and treatment, and transportation and storage.	4						v			v		
2	Computational fluid dynamics for petroleum engineering	The course discusses the basics and methods of modeling the behavior of fluid in reservoirs, perforation zones near wellbores and wells. Also, use computational methods to predict problems during transportation and cleaning of gas wells is covered.	5		v				v					
3	Geodesy with the basics of topography	The purpose of the discipline is to study the main tasks of the concept and definition of geodesy, the appearance of the relief, its display on maps and plans, solving the problems of topographic maps and plans, azimuths, directional angles, points, direct and reverse geodetic problems, types and methods of leveling. The discipline studies ways to create new plans for a geodetic network, specialized surveying, an overview of geodetic surveys, general information about plans to support new and high-altitude networks, ways to create a justification for shooting, an image of the earth's surface in a plane.	5			v				v				
4	Soil Science and Soil Mechanics	The purpose of the course of teaching the discipline is to familiarize future specialists with the basics of engineering geology, soil mechanics, general provisions of modern	5	v							v	v		

		methods of calculation, design and construction of foundations, foundations and underground structures. Related to the design, construction and operation of buildings and structures, the installation of underground utilities, laying pipelines. Soil mechanics studies the problems of stress-strain state, strength, deformability and stability of soil massifs and determines the conditions for their use as the foundations of construction objects.												
5	Diagnostics and testing of oil and gas facilities	The discipline studies the basic methods and models for diagnosing oil and gas objects. Also considers testing by statistical and dynamic methods in order to assess the characteristics of objects.	6		v			v				v		
6	Engineering geology	The purpose of the course: the acquisition of theoretical knowledge about the engineering-geological features and properties of rocks, geological and engineering-geological processes occurring in these rocks, engineering-geological conditions of various territories, the study of which is necessary to predict their changes during economic development. Geotechnical properties of rocks. The concept and characteristics of soils. Geological zoning. Methods of engineering and geological research, engineering and geological research for various types of construction. Principles of monitoring exogenous geological processes. Regional Engineering Geology.	5			v					v	v		
7	Engineering and computer graphics	The discipline is aimed at the study of	5		v			v		v				

		methods for the image of objects and the general rules of drawing, using computer graphics; the study of the basic principles and geometric modeling approach and methodology for developing applications with a graphical interface; the formation of skills in the use of graphic systems for the development of drawings, using 2D and 3D modeling methods												
8	Mathematics I	The course is devoted to the study of the basic concepts of higher mathematics and its applications. The main provisions of the discipline are applied in the teaching of all general education engineering and special disciplines taught by graduate departments. The course sections include elements of linear algebra and analytical geometry, an introduction to analysis, differential calculation of functions of one and several variables. Methods for solving systems of equations, problems of using vector calculations in solving problems of geometry, mechanics, and physics are considered. Analytical geometry on a plane and space, differential calculation of functions of one variable, derivatives and differentials, study of the behavior of functions, derivative and gradient in direction, extremum of a function of several variables.	5	v	v									
9	Mathematics II	The discipline is a continuation of Mathematics I. sections of the course include integral calculus of a function of one variable and several variables, series theory. Indefinite integrals, their properties and methods of their calculation. Certain integrals and their	5	v	v									

		application. Incorrect integrals. Numerical series theory, functional series theory, Taylor and Macloren Series, application of series to approximate calculations.													
10	Mathematics III	The discipline is a continuation of Mathematics II. The course includes sections: ordinary differential equations and elements of probability theory and mathematical statistics. Differential equations with separable variables, homogeneous, in full differentials, linear inhomogeneous differential equations with constant coefficients, systems of linear differential equations with constant coefficients, finding the probability of events, calculating the numerical characteristics of random variables, using statistical methods for processing experimental data are studied.	5	v	v										
11	Fluid mechanics	This fundamental course introduces students to fluid flow in pipes, surface facilities and in oil and gas wells. Topics to be covered are compressible and incompressible flow, fluid statics, dimensional analysis, laminar and turbulent flows, Newtonian and non-Newtonian fluids and two-phase flow.	5			v			v						
12	Chemistry	Purpose: formation of knowledge on fundamental issues of general chemistry and skills of their application in professional activity. Summary Laws, theoretical propositions and conclusions that underlie chemical disciplines; properties and relationships of chemical elements based on the periodic law of D.I.Mendeleev and on	5	v					v						

		modern ideas about the structure of matter; fundamentals of chemical thermodynamics and kinetics; processes in solutions; structure of complex compounds.												
13	Fundamentals of budgeting	The course strengthens knowledge and creates practical competencies based on the generalization of experience in transport construction in the discipline, the leading principles of pricing, advanced methods of calculating the estimated price, the use of software products in the estimate business, coordination, approval and examination of design and estimate documentation, assessment of calculated technical - financial characteristics of projects.	5				v				v			v
14	Design and operation of pump and compressor stations	The course is to teach future specialists about technology and organization of the construction of the linear part of trunk pipelines and the development of process diagrams for the installation of structures of pump and compressor stations, as well as the main and auxiliary process equipment, engineering networks and process pipelines, ensuring their safe operation and reliability over a standard service life and during construction and reconstruction.	5					v	v					
15	Design and operation of oil and gas storage facilities	Underground and aboveground reservoirs. The foundation and the base of the tanks. When choosing sites for the placement of reservoirs, they take into account: the quality and condition of the soils lying at the base of the site; climatic and seismic conditions of the area; the regime of groundwater flow, their chemical composition, as well as permissible	5					v	v					

		loads on the soil and the type of foundation that must be established for each case after a thorough analysis. Classification of oil depots. The main structures of oil depots. The nomenclature of domestic steel tanks. Technical characteristics of tanks Vertical isothermal tanks. Axisymmetric teardrop-shaped tanks. Horizontal tanks. Technical and economic indicators. Losses of oil and petroleum products during the operation of tank farms. The general procedure for the repair of tanks at oil depots. Determination of the volume of the tank farm and selection of tank types.													
16	Design of main pipelines	Trunk transportation of oil and gas. Classification of the main pipeline by types of pumping product (oil, petroleum products, natural gas). Determination of physical and chemical properties of oil, petroleum products and natural gas. Determination of the strength characteristics of the pipes of the main pipeline. Technological (hydraulic) calculation of the main pipeline by types of pumping product (oil and gas). Selection of the main equipment of the main pipeline. Determination of the number of pumping stations. Construction of the profile of the main pipeline route with the arrangement of pumping stations and the technological scheme of the main pipeline.	5					v	v						
17	Strength of materials	Stretching and compression. Pressure in sections and deformations of a direct core. Mechanical properties of materials at a stretching and com-	6	v											

		pression. Calculation on durability and rigidity at a stretching-compression. Geometrical charac-teristics of flat sections. Shift and torsion. Cal-culation on durability and rigidity at torsion. A bend. Normal and tangents of a pressure at a bend. Calculation on durability at a bend. The theory of the intense and deformed conditions. A hypothesis of a limiting condition. Complex resistance. Stability of balance of deformable systems. Dynamic loading.												
18	Thermodynamics and heat engineering	The discipline studies the basic concepts and definitions of heat. The first and the second law of thermodynamics. Thermodynamic processes of ideal gases. A discharge throttling gases and vapors. The process of vaporization, P,V; T, S; h, s – diagram of water vapor. Thermodynamic cycles of thermal engines and plants. Heat transfer. The thermal conductivity. Convective heat transfer. The heat transfer during forced and free motion of the fluid. Fundamentals of thermal calculation of heat exchangers.	5	V					V					
19	Physics I	Objectives: to study the basic physical phenomena and laws of classical, modern physics; methods of physical research; the relationship of physics with other sciences. The following topics are considered: mechanics, dynamics of rotational motion of a solid body, mechanical harmonic waves, fundamentals of molecular kinetic theory and thermodynamics, transport phenomena, continuum mechanics,	5	V				V						

		electrostatics, direct current, magnetic field, Maxwell equations.												
20	Physics II	The course studies the laws of physics and their practical application in professional activity. Solving theoretical and experimental-practical educational problems of physics for the formation of the foundations in solving professional problems. Assessment of the degree of accuracy of the results of experimental or theoretical research methods, modeling of physical condition using a computer, study of modern measuring equipment, development of skills for conducting test studies and processing their results, distribution of the physical content of applied tasks of the future specialty.	5	v				v						
21	Operation of main pipelines	The order of operation of the main oil pipeline and the main gas pipeline. Organization of operation of the linear part and pumping stations of the main pipeline. Operational dispatch control of the main pipeline. Maintenance and repair of the main pipeline. Special operating conditions of the main pipeline.	4					v						v
Cycle of basic disciplines Election Component														
1	Fundamentals of rationing and tariff formation	Determination of normative technical losses, technical and technological norms of consumption of raw materials, materials, fuel, energy during the operation of the main pipeline by types of pumping products (oil and/or natural gas). Formation of a tariff for: - transportation of oil and/or natural gas; - storage of oil and/or natural gas; - internal and external market.	5				v							v

2	Solving the problems of oil and gas engineering	The discipline considers case studies with industry and their solutions, which include topics of machinery and technology in drilling, mining, development and transportation; safety equipment, labor protection, management.	5						v		v			
Cycle of profileded disciplines University component														
1	Engineering calculation approaches in the oil and gas industry	This discipline covers the basic methods of statistics, including quantitative and qualitative methods, which are necessary in the modeling and design of objects, adoption of engineering, organizational and technological and management decisions. Applied engineering problems are considered in order to form ideas about modern trends in industries.	4		v					v				
2	Management in the design and construction of oil and gas facilities	The course is aimed at the formation of the following professional competencies: creating a process model, building an object, selecting contractors, managing the work of contractors (design, construction and installation works, production), monitoring and forecasting the processes involved in terms of timing, money and labor costs and the ratio of the developed business -models	5				v			v				v
3	Multidisciplinary petroleum project	This class provides multidisciplinary setting for students to integrate knowledge of geology, geophysics, and petroleum engineering to solve real tasks of the oil and gas industry. Students work in teams, and in the end present results of their work in oral and written forms.	5							v			v	
4	Corrosion protection of oil and gas equipment	Basic concepts and definitions of corrosion processes. Chemical	6	v							v		v	

		corrosion of metals. Electrochemical corrosion of metals. Corrosive surveys. Insulation coating metal structures. Cathodic protection of underground metal structures. Protector protection of pipelines and tanks. Electro drainage protection of underground pipelines. Inhibitor corrosion.													
5	Computer - aided design	This discipline deals with the methodology of computer-aided design, the decompositions of technical systems, efficiency of technical systems, impact of environment on technical systems as well as fundamental concepts of analysis machines. Concepts of modern design technologies with application of CAD/CAE/CAM systems. Widely regarded methods of geometric modeling used in modern CAD systems. Discusses the integration and modularity of CAD/CAE/CAM systems. Also concepts of contemporary approaches to design with the use of CALS - technologies, when collectively considered the entire life cycle of designed object from conceptual design to disposal. Examines the current direction of CALS - technologies and international standards (ISO and STEP standards). During the course, students solve problems on geometric constructions with the use of AutoCAD, mastering the methods of automation of engineering calculations using Visual Basic programming language, composed of MS Excel.	4		v	v			v						
6	Economic evaluation of oil and gas	The standard analysis of cash flow for	6											v	v

	projects	oil projects and the determination of acceptability of proposed projects in terms of their attractiveness and feasibility.													
Cycle of profileded disciplines Election Component															
1	Risk analysis	This course embraces possible consequences in every certain situation the effective analysis of risks allows to find out problems and estimate prospects. Some themes are plugged in itself: it is a deterministic analysis of risks the "best, the worst and most credible variant"; it is a stochastic analysis of risks.	5			v						v		v
2	Engineering of oil and gas processing complexes	This discipline covers the engineering processes of oil and gas processing complexes and solving problems when choosing methods.The purpose of this course is the formation of students' skills in the application of analytical and numerical tools for engineering oil and gas processing complexes.	5								v	v		v
3	Overhaul of pipelines	Overhaul of pipelines Types of repair work. Current repairs. Average repair. Major repairs. Diagnostics of trunk pipelines. Types, their advantages and disadvantages. Organization of operation of the linear part and pumping stations of the main pipeline. Maintenance of the main pipeline. Special operating conditions of the main pipeline. Safety precautions during repair work.	5					v						v
4	Petroleum regulations and practices	This course covers major aspects of law governing oil and gas business. It introduces such topics as scientific and engineering background of oil and gas law, energy policy, and oil and gas lease. This course focuses on	5				v				v			v

		the legal rules that govern the development of privately owned mineral rights, which often also apply to governmentally owned resources. It covers topics such as the nature, protection, and conveying of oil and gas rights, leasing, and taxation.													
5	Fundamentals of Data Analytics and Programming for Petroleum Engineers	The main purpose of the discipline is to assess the reliability of equipment in the oil and gas industry and predict complications, the choice of methods to increase oil supply, optimization of transportation routes, mastering the basic skills of predicting the effectiveness of new fields.	5		v	v									
6	Petroleum Engineering seminar	Professional communication and research skills are essential qualities for future researchers. This course is aimed at developing the skills of oral and written communication, critical analysis of information and their processing, presentation and giving/receiving feedback from colleagues, as well as the preparation of scientific theses and articles	5				v							v	
7	Multiphase flow systems	The course covers the formation of multiphase flows in horizontal, inclined and vertical wells, and pipelines, methods of dynamic calculations, the definition of technological parameters. General conservation laws, interfacial conditions, and constitutive relationships. Multiphase flows in pipes, maps of flow regimes, distribution of concentrations, pressure drop.	5	v		v									
8	Construction of pipelines	Construction of pipelines The order of construction of the main oil pipeline and the main gas pipeline. Organization of construction of the	5					v							v

		linear part and pumping stations of the main pipeline. Features of transitions of trunk pipelines through artificial and natural barriers. Construction supervision during the construction of the main pipeline. Safety precautions in the construction of trunk pipelines												
9	Theory and practice of project management	The discipline is aimed at studying the general trends of project management in market conditions in order to increase productivity in the professional industry. The essence, concept, composition, tasks and problems of management. Study of the scientific methodology of project management. The concept of organization, the external and internal environment of the team, communication. Requirements for project management. The role of decision-making in project management. The concept of anti-crisis programs in the performance of managerial functions. The concept of management culture and professional etiquette	5	v									v	
10	Technical policy	An idea is given about the strategic development of the organization / enterprise through the use of research and development work, technical regulation during the operation of the main pipeline.	5				v		v			v	v	
11	Environmental and safety management	The course covers the principles and management of the environment and environmental safety. Environmental rationing. Environmental assessment. Environmental expertise. Environmental permits. Environmental damage. Ecological culture, education and enlightenment.	5									v	v	

5. Curriculum of the educational program

KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K.I.SATBAYEV

SATBAYEV UNIVERSITY

APPROVED

CURRICULUM

of Educational Program on enrollment for 2023-2024 academic ye

Educational program 6B07126 - "Transmission networks and infrastructu

Group of Educational programs 6B165- "Transmission networks and infrastructu

Form of study: full-time Duration of study: 4 years Academic degree: Bachelor of Engineering and Technology

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							
								I course		II course		III course		IV course	
								1 semester	2 semester	3 semester	4 semester	5 semester	6 semester	7 semester	8 semester
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)															
M-1. Module of language training															
LNG 108	English language	GED, RC	10	300	0/0/6	210	E	5	5						
LNG 104	Kazakh (Russian) language	GED, RC	10	300	0/0/6	210	E	5	5						
M-2. Module of physical training															
KFK 101-104	Physical Culture	GED, RC	8	240	0/0/8	120	Diffcredit	2	2	2	2				
M-3. Module of information technology															
CSE 017	Information and communication technologies (in English)	GED, RC	5	150	2/1/0	105	E			5					
M-4. Module of socio-cultural development															
HUM 137	History of Kazakhstan	GED, RC	5	150	1/0/2	105	SE	5							
HUM 132	Philosophy	GED, RC	5	150	1/0/2	105	E			5					
HUM 120	Socio-political knowledge module (sociology, politology)	GED, RC	3	90	1/0/1	60	E			3					
HUM 134	Socio-political knowledge module (culturology, psychology)		5	150	2/0/1	150	E				5				
M-5. Module of anti-corruption culture, ecology and life safety base															
HUM 136	The base of anti-corruption culture and law	GED, CCH	5	150	2/0/1	150	E				5				
MNG 289	Fundamentals of commerce and entrepreneurship														
PET519	Fundamentals of scientific research methods														
OHE 656	Ecology and life safety														
CYCLE OF BASIC DISCIPLINES (BD)															
M-6. Module of physical and mathematical training															
MAT 101	Mathematics I	BD, UC	5	150	1/0/2	105	E	5							
PHY 111	Physics I	BD, UC	5	150	1/1/1	105	E	5							
PHY 112	Physics II	BD, UC	5	150	1/1/1	105	E		5						
MAT 102	Mathematics II	BD, UC	5	150	1/0/2	105	E		5						
MAT 103	Mathematics III	BD, UC	5	150	1/0/2	105	E			5					
M-7. Basic general technical training module															
GEN 429	Engineering and computer graphics	BD, UC	5	150	1/0/2	105	E		5						
PET440	Introduction to Major	BD, UC	4	120	1/1/1	75	E	4							
GIG101	Engineering ecology	BD, UC	5	150	2/1/0	105	E				5				
GEN442	Strength of materials	BD, UC	6	180	2/1/1	120	E			6					
CHEE495	Chemistry	BD, UC	5	150	1/1/1	105	E			5					
PET409	Thermodynamics and heat engineering	BD, UC	5	150	1/0/2	105	E				5				
PET480	Fluid mechanics	BD, UC	5	150	1/1/1	105	E					5			
MAP113	Geodesy with the basics of topography	BD, UC	5	150	2/1/0	105	E				5				
GEO409	Soil Science and Soil Mechanics	BD, UC	5	150	2/1/0*	105	E					5			
PET178	Computational fluid dynamics for petroleum engineering	BD, UC	5	150	1/1/1	105	E					5			
PET507	Educational practice	BD, UC	2						2						
M-8. Basic training module for oil and gas transportation and storage															
PET513	Design of main pipelines	BD, UC	5	150	1/0/2	105	E					5			
PET514	Design and operation of pump and compressor stations	BD, UC	5	150	1/0/2	105	E					5			
3215	Elective	BD, CCH	5	150	2/1/0*	105	E					5			
PET407	Department component	BD, UC	5	150	1/1/1	105	E						5		
PET515	Design and operation of oil and gas storage	BD, UC	5	150	1/0/2	105	E						5		
PET491	Operation of main pipelines	BD, UC	4	120	1/0/2	75	E						4		
PET492	Diagnostics and testing of oil and gas facilities	BD, UC	6	180	2/1/1*	120	E							6	
CYCLE OF PROFILE DISCIPLINES (PD)															
M-9. Oil and gas transportation and storage professional activity module															
PET493	Engineering calculation approaches in the oil and gas industry	PD, UC	4	120	2/0/1	75	E						4		
PET494	Computer - aided design	PD, UC	4	120	1/1/1	75	E						4		
3205	Elective	PD, CCH	5	150	2/1/0*	105	E						5		
PET498	Economic evaluation of oil and gas projects	PD, UC	6	180	2/1/1*	120	E							6	
PET495	Corrosion protection of oil and gas equipment	PD, UC	6	180	2/1/1*	120	E							6	
4306	Elective	PD, CCH	5	150	2/1/0*	105	E							5	
4307	Elective	PD, CCH	5	150	2/1/0*	105	E							5	
4308	Elective	PD, CCH	5	150	2/1/0*	105	E							5	
PET441	Multidisciplinary petroleum project	PD, UC	5	150	2/1/0*	105	E								5
PET518	Management in the design and construction of oil and gas facilities	PD, UC	5	150	1/1/1	105	E								5
4311	Elective	PD, CCH	5	150	2/1/0*	105	E								5
PET516	Production practice I	PD, UC	2								2				
PET526	Production practice II	PD, UC	3									3			
AAP155	Predictable Practice	PD, UC	4												4
M-10. Module of final attestation															

ECA198	Final attestation	FA	8														8
M-11, Module of additional types of training																	
AAP590	Military affairs	ATT	0														
Total based on UNIVERSITY:									31	29	31	29	30	30	33	27	
									60		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 educative disciplines	51		5	56
BD	Cycle of basic disciplines		107	5	112
PD	Cycle of profile disciplines		39	25	64
	Total for theoretical training:	*51*	*146*	*35*	*232*
FA	final attestation	8			8
	TOTAL:	59	146	35	240

Decision of the Academic Council of Kaznu named after K.Satpayev. Protocol № 5 24 november 2022 y.

Decision of the Educational and Methodological Council of Kaznu named after K.Satpayev. Protocol № 3 17 november 2022 y.

Decision of the Academic Council of the Institute. Protocol № 1 "17" 10 2022 y.

Vice Rector for Academic Affairs B.A.Zhautikov

Institute Director A.H.Syzdykov

Head of the "Petroleum Engineering" G.Zh.Yeligbaeva

Specialty Council from employers N.A.Nysangaliev

KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY after K. SATBAYEV

SATBAYEV UNIVERSITY

APPROVED
Director of the Institute of Geology, Oil and Gas Engineering
S. Syzdykov
«9» 12 2022г.

MAJOR ELECTIVE DISCIPLINES educational program for the 2023-2024 academic year admission
Educational program 6B07126 - "Transmission networks and infrastructure"
Group of Educational programs 6B165- "Transmission networks and infrastructure"

Full-time study Study duration : 4 years Academic degree: bachelor of natural sciences

Year of study	Code of elective	Code of discipline	Name of discipline	Semestr	Cycle	Credits	Total hours	lec/lab/pr	SIW (including SIWT) in hours	Prerequisites
			Basic training module for oil and gas transportation and storage							
3	3215	PET443	Fundamentals of rationing and tariff formation	5	B	5	150	3/0/2		
		PET151	Solving the problems of oil and gas engineering					1/1/1		
			Oil and gas transportation and storage professional activity module							
3	3303	PET516	Environmental and safety management	6	n	5	150	1/0/2		
		PET517	Petroleum Engineering seminar					2/1/0		
4	4306	PET447	Technical policy	7	n	5	150	2/0/1		
		PET451	Fundamentals of Data Analytics and Programming for Petroleum Engineers					2/0/1		
	4307	PET496	Overhaul of pipelines	7	n	5	150	1/0/2		
		PET493	Construction of pipelines					1/0/2		
	4308	PET450	Engineering of oil and gas processing complexes	7	n	5	150	2/0/1		
		PET429	Multiphase flow systems					1/0/2		
			Module"R&D"							
4	4311	PET449	Risk analysis	8	n	5	150	2/0/1		
		PET417	Petroleum regulations and practices					1/1/1		
		NSE185	Theory and practice of project management					2/0/1		

Credits numbers of elective disciplines over the entire period of study	
Cycle of disciplines	Credits
Cycle of basic disciplines (B)	5
Cycle of special disciplines (S)	25
Overall:	30

By the decision of the Academic Council of the Institute. Minutes № 2, dated "14" 12. 2022г.

Head of the "Petroleum Engineering" department G.Yeligbaeva

Representative of Specialty council N.A.Nysangaliev