NJSC «Kazakh national research technical university named after K.I. Satpayev»

K. Turysov Institute of Geology, Oil and Mining

Petroleum Engineering Department

EDUCATIONAL PROGRAM

Bachelor of engineering and technology in the educational program

« 6B07209 Transmission networks and infrastructure »

2nd edition in accordance with the 2018 State Mandatory

Educational Standards for Higher Education

Almaty 2022

СӘТБАЕВ УНИВЕРСИТЕТІ SATBAYEV UNIVERSITY

The education program was developed by the faculty of the Department of Petroleum engineering

PE Department Head Yeligbayeva G.
agreed:
Director of G&OGB Institute Syzdykov A.

From employers:
1. Askar Munara, Managing Director for Field Planning, KazMunayGas Research Institute of Production and Drilling Technologies LLP,
2. Beibit Jumanov, Completion Engineer Weatherford.

From the academic partner:
1. Erdal Ozhan, Head of the Department of Petroleum Engineering, Colorado School of Mines, Chairman of the Industry Advisory Board of the Petroleum Engineering Program.

Approved at a meeting of the Educational and Methodological Council of the Kazakh National Research Technical University named after K.Satpayev. Minutes No 3 dated 25 June, 2021

Qualification:
Level 6 of the National Qualifications Framework:
6B07 Engineering, manufacturing and construction industries
6B072 Manufacturing and processing industries (bachelor)

Professional competence: Organization and management of processing and technologies of drilling oil and gas wells, field development, production and transportation of oil and gas.

CONTENT

BRIEF DESCRIPTION OF THE PROGRAM

The aim of developing an educational program (EP)

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

The EP defines the programmatic educational goals, learning outcomes of students, the necessary conditions, content, and technologies for the implementation of the educational process, assessment, and analysis of the quality of students during study and after graduation.

EP includes the curriculum, content of the course and learning outcomes, and other resources to provide quality education for students.

The purpose of the EP "Transmission networks and infrastructure " is to help students, faculty and industry experts understand the structure of the educational process and demonstrate how the curriculum and course content contribute to the formation of the necessary corecompetencies after graduation by students. Last but not least, the EP's goal is to establish a common framework for the feasibility and necessity of a "Transmission networks and infrastructure " training program for all stakeholders, including government, government agencies, the oil and gas industry, universities, parents and students, and the community.

Regulatory documents used to develop this educational program

Legal framework and recommended methods used for the development of EP "Transmission networks and infrastructure ":

- Law of the Republic of Kazakhstan dated July 27, 2007 No. 319-III "On Education";
- Decree of the Government of the Republic of Kazakhstan dated August 23, 2012 No. 1080 "On approval of state compulsory education standards of the corresponding levels of education";
- Decree of the Government of the Republic of Kazakhstan dated May 17, 2013 No. 499 "On approval of the Model Rules for the Activities of Educational Organizationsof the appropriate types, including the Model Rules for Educational Organizations Implementing Additional Educational Programs for Children" (as amended on April 7, 2017);
- State compulsory education standard SES 03.08.334.-2006 in specialty;
- Other regulatory and methodological documents of the Ministry of Education and Science of the Republic of Kazakhstan;
- Industry qualifications framework for oil and gas, oil refining and petrochemical

industries, Astana, 2017, http://www.kazenergy.com/upload/document/industry-frame/ork.pdf (last accessed October 8, 2021);

- Methodological recommendations for the development and execution of sectoral qualifications frameworks, Astana, 2016, http://atameken.kz/uploads/content/files/ Methodology% 20% 20ОРК% 202016.pdf (last accessed October 8, 2021);
- The working curriculum for the specialty "Transmission networks and infrastructure", approved by order № ___ of _____ 2021 by the Rector of the Kazakh National Research Technical University named after K.I.Satbayev;
- Documents of the TQM (Total Quality Management) system on the organization of the educational process at the Kazakh National Research Technical University named after K.I. Satbayev;
- The SPE Technical Knowledge for Graduating Engineers Matrix, http://www.spe.org/training/docs/graduating_matrix.pdf (last accessed October 8, 2021);
- SPE Competency Matrices, https://www.spe.org/training/competency.php (last accessed October 8, 2021);
- ABET Accreditation Criteria and Supporting Documents, http://www.abet.org/accreditation/accreditation-criteria/

General information for the development of an educational program

As shown in Figure 1, the provisions defining a quality EP start with clear and concise Program Educational Objectives, (hereinafter PEO), which are closely related to the mission of the program.

In addition, the PEO determines the expected knowledge and skills of students upon graduation.

EP "Transmission networks and infrastructure" in the formation of knowledge and skills of students after graduation was based on Criterion 3 ABET (Accreditation Board for Engineering and Technology) – Student Outcomes, since among engineering courses, ABET accreditation is considered prestigious and highly recommended.

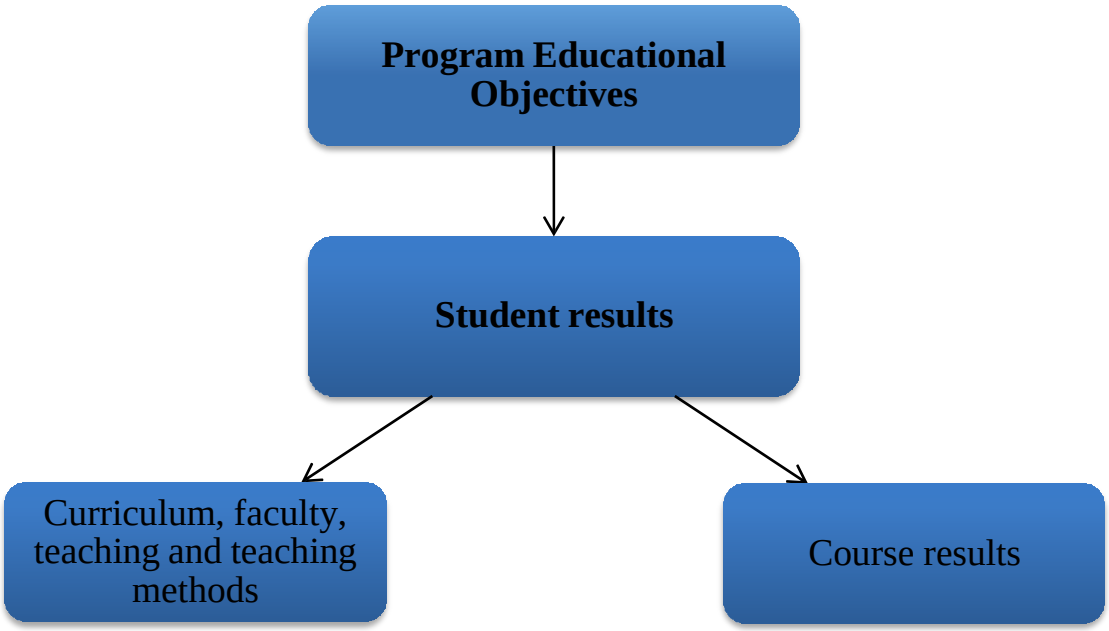

Figure 1 - The relationship of different components in the definition of the educational program

Professional and labor activities

An area of professional activity or a ***professional group*** is a set of types of labor activity in an industry that has a common integration basis (analogous or similar purpose, objects, technologies, including labor tools) and assumes a similar set of labor functions and competencies for their implementation.

The type of labor activity or ***professional subgroup*** is a part of a professional group, a set of professions, formed by an integral set of labor functions and the competencies necessary for their implementation.

Table. 1 shows 5 main areas of professional activity and 21 types of labor activityfor graduates of EP "Transmission networks and infrastructure", according to the sectoral framework of qualifications (hereinafter SFQ). It should be noted that during the process of developing the EP "Transmission networks and infrastructure", the experience of the world oil and gas industry was taken into account in the classification of the main areas of professional activity. EP "Transmission networks and infrastructure" includes the best world practices ofthe oil and gas industry, while at the same time building on the existing historical traditions.

Table 1 - Areas of professional and work activities in the oil and gas industry, accordingto the SFQ (6-level: bachelor's degree)

Professional group	Professional subgroup
Oil and gas transportation	Design of main pipelines
	Operation of main pipelines
	Maintenance and repair
	of oil and gas transportation services
	Operational dispatch management
	Commodity transport operations
	Rationing and tariff formation
	Legal relations in the field of the main pipeline
	Safety of the main pipeline
	Technical policy in the field of the main pipeline
	Conservation and liquidation of the main pipeline

Contact infromation

Gulzhakhan Yeligbayeva, Head of the Petroleum Engineering Department at SatbayevUniversity.
22 Satpayev street, Oil Facility, Office 711.
telephone.: 8-727-320-4058, 8-702-694-9714
email: G.Yeligbayeva@satbayev.university

ACADEMIC REQUIREMENTS

Admission requirements

Admission to a university is carried out according to the applications of anapplicant who completed secondary, secondary- professional education in full on a competitive basis in accordance with the points of the certificate issued based on the results of a single national test with a minimum score of at least 65 points, including at least 5 points - in the History of Kazakhstan, quantitative literacy, reading literacy - the language of study, and at least 5 points in each profile subject.

Special requirements for admission to the program apply to graduates of 12-year schools, colleges, applied bachelor's programs, NIS, etc. These applicants must pass diagnostic testing in English, mathematics, physics, and special disciplines.

Table 2 - Rules for credit transfer for accelerated education based on 12-year secondary,secondary- technical and higher education

Code	Competency type	Description of competence	Competence Result	In Change
GENERAL (It implies full training with possible additional, depending on the level of knowledge)				
G1	Communicativeness	- fluent monolingual speaking, writing and communication skills - the ability to not fluently communicate with a second language - ability to use communicative capability in various situations - there are the basics of academic writing in the native language - diagnostic test for language level	Full 4-year study with a minimum of 240 academic credits (of which 120 contact classroom academic credits) with a possible transfer of credits in a second language, where students have an advanced level. The level of the language is determined by passing a diagnostic test	Department of Kazakh and Russian Languages, Department of English Language
G2	Quantitative Literacy	- Basic mathematical thinking at the communication level - the ability to solve situational problems based on the mathematical apparatus of algebra	Full 4-year study with a minimum of 240 academic credits (of which 120 contact classroom academic credits). With a positive passing of	Department of Math

		and the beginnings of mathematical analysis - diagnostic test for mathematical literacy in algebra	the diagnostic test, the level of Mathematics is 1, with a negative - the level of Algebra and the beginning of the analysis	
G3	Basic literacy in science disciplines	- basic understanding of the scientific picture of the world with an understanding of the essence of the basic laws of science - understanding of basic hypotheses, laws, methods, formulation of conclusions and estimation of errors	Full 4-year study with a minimum of 240 academic credits (of which 120 contact classroom academic credits). With a positive passing of the diagnostic test, the level of Physics 1, General Chemistry, with a negative - the level of the Beginning of Physics and Basic Foundations of Chemistry	Natural Sciences Departments
SPEFICIC (implies reduced training through credit transfer depending on the level of knowledge in competencies for graduates of 12-year schools, colleges, universities, including humanitarian and economic areas)				
S1	Communicativeness	- Fluent bilingual oral, written and communication skills - ability to communicate fluently with a third language - skills of writing text of different style and genre - skills of deep understanding and interpretation of one's own work of a certain level of complexity (essay) - basic aesthetic and theoretical literacy as a condition for full-fledged perception, interpretation of the	Full credit transfer by language (Kazakh and Russian)	Department of Kazakh and Russian languages
		original text		

S2	Quantitative Literacy	- Special mathematical thinking using induction and deduction, generalization and concretization, analysis and synthesis, classification and systematization, abstraction, and analogy - the ability to formulate, substantiate and prove assumptions - application of general mathematical concepts, formulas and extended spatial perception for mathematical problems - a complete understanding of the basics of mathematical analysis	Credit transfer in the discipline Mathematics (Calculus) I	Department of Math
S3	Special literacy in natural sciences (Physics, Chemistry, Biology and Geography)	- Broad scientific perception of the world, offering a deep understanding of natural phenomena - critical perception for understanding scientific phenomena of the surrounding world - cognitive ability to formulate a scientific understanding of the forms of existence of matter, its interaction, and manifestations in nature	Credit transfer for Physics I, General Chemistry, General Biology, Introduction to Geology, Introduction to Geodesy; Study practice, etc.	Natural Sciences Departments
S4	English Language	- readiness for further self-study in English in various fields of knowledge - willingness to gain	Transfer of English credits above academic to professional level (up to 15 credits)	Department of English Language

		experience in design and research work using English		
S5	Computer skills	- Basic programming skills in one modern language - use of software and applications for training in various disciplines - existence of a global standard of language level certificate	Transfer of credits for the discipline Introduction to Information and Communication Technologies, Information and Communication Technologies	Department of Software Engineering
S6	Social and humanitarian competences and behavior	- understanding and awareness of the responsibility of each citizen for the development of the country and the world - Ability to discuss ethical and moral aspects in society, culture, and science	Credit Transfer for Modern History of Kazakhstan (except for state exam)	Department of Social Disciplines
		- Critical understanding and ability for polemics for debating on contemporary scientific hypotheses and theories	Recalculation of credits in philosophy and other humanitarian disciplines	
PROFESSIONAL (implies reduced training through credit transfer, depending on the level of knowledge in competencies for graduates of colleges, private schools, universities, including humanitarian and economic areas)				
P1	Professional competence	- critical perception and deep understanding of professional competencies at level 5 or 6 - Ability to discuss and argue on professional issues within the framework of the mastered program	Transfer of credits in basic professional disciplines, including an introduction to the specialty, the structure and design of systems and machines by industry, after-sales service of machines by industry,	Petroleum Engineering Department

P2	General engineering competencies	- basic general engineering skills and knowledge, the ability to solve general engineering problems and problems - be able to use software packages for processing experimental data, solving systems of algebraic and differential equations	Credit transfer for general engineering disciplines (Engineering graphics, descriptive geometry, fundamentals of mechanics, fundamentals of hydrodynamics, fundamentals of electrical engineering, fundamentals of microelectronics, fundamentals of thermodynamics, fundamentals of geology, etc.)	Petroleum Engineering Department
P3	Computer engineering competence	- basic skills of using computer programs and soft systems for solving general engineering problems	Credit transfer for the following computer graphics disciplines, CAD fundamentals, CAE fundamentals, etc.	Petroleum Engineering Department
P4	Engineering and working competencies	- skills and abilities to use technical means and experimental devices for solving general engineering problems	Transfer of credits for academic disciplines of the experimental direction: turning and locksmithing, repair work, welding, laboratory or analytical chemistry, laboratory physics, mineralogy, etc.	Petroleum Engineering Department

P5	Socio-economic competencies	- Critical understanding and cognitive reasoning ability on contemporary social and economic issues - Basic understanding of the economic assessment of objects of study and the profitability of industry projects	Recalculation of credits in socio-humanitarian and technical and economic disciplines in the offset of the elective cycle	Petroleum Engineering Department

The university may refuse to transfer credits if a low diagnostic level is confirmedor the final grades in completed disciplines were below A and B.

Requirements for completion EP and graduating

Description of the generally obligatory standard requirements for graduating froma university and assigning an academic bachelor's degree: completing at least 240 academic credits of theoretical study and a final capstone project or a state exam, according to the specialty.

The form of education: Full-Time

The length of study: from 4 to 7 years.

The language of study: Kazakh, Russian, English

ECTS Diploma Supplement

The European Diploma Supplement (hereinafter - the European Supplement), or the Diploma Supplement (DS), is, along with ECTS (European Credit Transfer System),

an effective tool for ensuring academic and professional mobility in the European Higher Education Area.

The aim of the DS is to provide comprehensive independent data in order to ensure international "transparency" and objective academic and professional recognitionof qualifications (diplomas, degrees, certificates, etc.).

Requirements:

1. The European Diploma Supplement is issued by the Kazakh National Research Technical University named after K.I.Satbayev to graduates of accredited educational programs only in strict accordance with the model developed by the Joint Working Group of representatives of the European Commission, Council of Europe, and UNESCO.

2. The European Diploma Supplement does not contain any judgments of the assessment plan, comparisons with other study programs and recommendations

regarding the possibility of recognition of this diploma or qualification.

3. The European Diploma Supplement consists of eight sections and must contain information on all sections. In the absence of information in any of the sections of the European Diploma Supplement, it is necessary to indicate the reasons for refusing to provide mandatory information.

4. The European Diploma Supplement must always accompany the original document of education, as it has no legal force. The presence of the European Diploma Supplement does not guarantee the status of an educational institution, its qualifications,or the fact that it is recognized as an integral part of the national higher education system.

5. Each European Diploma Supplement must begin with a preamble:

"This Diploma Supplement follows the model developed by the European Commission, Council of Europe and UNESCO / CEPES. The purpose of the Supplement is to provide comprehensive independent data in order to ensure international "transparency" and objective academic and professional recognition of qualifications (diplomas, degrees, certificates, etc.). The application contains a description of the nature, level and status of training passed and successfully completed by the person named in the original qualification document.Judgments, statements of equivalence, or proposals for recognition are not permitted in the Appendix. Data should be reported for all eight sections. In the absence of such data, the reason must be indicated. "

6. The European Diploma Supplement must always contain the title and the degree of qualification; name and status of the awarding / managing institution and the classification of the qualifications. All these data must be presented in official and English languages, since an incorrect translation misleads those who make judgments about qualifications. In cases where an alphabet other than Latin is used, transliteration is permitted. You can link the titles of degrees and qualifications to the description of the higher education system in the eighth section.

7. Educational institutions should take appropriate measures to reduce to a minimum the possibilities of fraud and misrepresentation of the European Diploma Supplements.

8. Special attention should be paid to translation and terminology. To overcome the problems arising in this area, it is essential that the original language is used where indicated in the document.

9. In the European Diploma Supplement, the assessment of qualifications obtained in other countries should focus on the knowledge, skills and abilities acquired, taking into account the fact that it is not exact equivalence but "fair recognition" that should be sought.

The diploma supplement consists of 8 mandatory items and is issued in English and Kazakh / Russian languages.

1. Information identifying the holder of the qualification
2. Information identifying the qualification
3. Information on the level of the qualification
4. Information on the contents and results gained
5. Information on the function of the qualification
6. Additional information
7. Certification of the supplement
8. Information on the national higher education system

« TRANSMISSION NETWORKS AND INFRASTRUCTURE » EP's WORKING CURRICULUM

Year of study	Code	Name of discipline	Cycle	Total amount in loans	lec/lab/pr	SRS (including SRSP), in hours	pre-requisites
1	**1st semester (Fall 2021)**						
	LNG108	English	G	5	0/0/3	105	Diagnostic test
	LNG104	Kazakh (Russian) language	G	5	0/0/3	105	Diagnostic test
	PET103	Introduction to Major	G	5	1/0/2	105	no
	PHY111	Physics I	B	5	1/1/1	105	no
	MAT101	Mathematics I	B	5	1/0/2	105	no
	CEN177	Engineering and computer graphics	B	5	1/0/2	105	no
	HUM129	Culturology	G	2	1/0/0	45	no
	KFK101	Physical training I	G	2	0/0/2	30	no
	Total:			**34**			
	2nd semester ((Spring 2022)						
	LNG108	English	G	5	0/0/3	105	yes
	LNG104	Kazakh (Russian) language	G	5	0/0/3	105	yes
	HUM100	Contemporary history of Kazakhstan	G	5	1/0/2	105	yes
	PHY464	Electromagnetism.Optics.	B	5	1/1/1	105	PHY111
	MAT102	Mathematics II	B	5	1/0/2	105	MAT101
	HUM128	Political science	G	2	1/0/0	45	no
	CHEE495	Chemistry	B	5	1/1/1	105	no
	KF102	Physical training II	G	2	0/0/2	30	KF101
	Total:			**34**			
2	**3th semester (Fall 2022)**						
	HUM132	Philosophy	G	5	1/0/2	105	no
	CHE451	Life safety	G	2	1/0/0	45	no
	MAT103	Mathematics III	B	5	1/0/2	105	MAT102
	HUM122	Psychology	G	2	1/0/0	45	no
	MNG487	Fundamentals of Entrepreneurship, Leadership, and anti-corruption culture	G	3	1/0/1	60	no
	GEN408	Strength of materials	B	5	1/1/1	`105	PHY112
	GIG101	Engineering geology	B	5	2/1/0	105	CHE192
		Elective	B	5	1/1/1	105	no
	KFK103	Physical training III	G	2	0/0/2	30	KFK102
	Total:			**34**			
	4th semester (Spring 2023)						
	CSE677	Information and Communication Technologies (eng)	G	5	2/1/0	105	no
	HUM127	Sociology	G	2	1/0/0	45	no
	CHE452	Ecology and sustainable development	G	2	1/0/0	45	no
	MAP100	Fundamentals of Engineering Geodesy	B	5	1/1/1	105	no
	PET409	Thermodynamics and heat engineering	B	5	1/0/2	105	PHY112
	PET410	Fluid mechanics	B	5	1/1/1	105	no
	GEO409	Soil Science and Soil Mechanics	B	5	2/1/0	105	no
	KFK104	Physical training IV	G	2	0/0/2	30	AAP122
	Total:			**31**			
3	**5th semester (Fall 2023)**						
	PET401	Diagnostics and testing of oil and gas facilities	B	5	2/1/0	105	no
	PET402	Engineering calculation approaches in the oil and gas industry	B	5	2/1/0	105	PET410
	PET428	Design and operation of pump and compressor stations	B	5	1/0/2	105	no
		Elective	B	5	2/1/0	105	no
	PET445	Design of main pipelines	S	5	1/0/2	105	PET103
	Total:			**25**			
	6th semester (Spring 2024)						
	PET178	Computational fluid dynamics for petroleum engineering	B	5	1/1/1	105	PET124
	PET446	Operation of main pipelines	B	5	1/0/2	105	PET445
	PET448	Design and operation of oil and gas storage facilities	S	5	1/0/2	105	PET103
	PET403	Fundamentals of budgeting	S	5	1/1/1	105	no
		Elective	B	5	2/0/1	105	PET103
	Total:			**24**			

	7th semester (Fall 2024)						
4	PET419	Corrosion protection of oil and gas equipment	S	5	2/0/1	105	no
	PET430	Computer - aided design	S	5	2/0/1	105	CSE677
	PET404	Management in the design and construction of oil and gas facilities	B	5	1/1/1	105	PET403
	PET111	Economic evaluation of oil and gas projects	S	5	1/0/2	105	no
		Elective	S	5	2/0/1	105	no
	Total:			**25**			

8th trimester ((Spring 2025)						
ECA003	Preparation for diploma project	FA	6			
ECA103	Diploma project defense	FA	6			
PET441	Multidisciplinary petroleum project	B	5	2/1/0	105	no
	ELECTIVE	S	2	2/1/0	105	no
Total:			**22**			

Year of study	Code	Name of discipline	Cycle	Credits	Semester
Obligatory academic elements with P/NP assessment					
1	AAP149	Study internship (B)	B	3	2
2	AAP141	Industrial Internship I (П)	B	4	4
3	AAP176	Industrial Internship II (П)	S	8	6
Additional academic elements					
1	AAP107	Sectional sports club	G	0	5-7
2-3	AAP500	Military training	G	0	3-6

Total number of credits			
Cycle of disciplines	Credits		
	compul-sary	additional	total
Cycle of general disciplines (G)	58	0	58
Cycle of basic disciplines (B)	112	0	112
Cycle of special disciplines (S)	60	0	60
Total of theoretical study :	230	0	**230**
Final attestation (FA)	12	0	**12**
Total:	242	0	**242**

TRANSMISSION NETWORKS AND INFRASTRUCTURE EDUCATIONAL PROGRAM's OBJECTIVES

1. Our graduates 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. Our graduates will be able to effectively convey information and thoughts to other people.
3. Our graduates will practice ethical, social, and environmental standards in theirprofessions in a responsible manner.
4. Our graduates will exhibit a high level of competence in engineering principles and practice.
5. Our graduates will be able to work in diverse industry and multicultural teams.
6. Our graduates will serve society, the oil and gas industry, the country through participation in professional communities and public organizations.
7. Our graduates will be successful professionals, ready to lead a team, organization, the Republic of Kazakhstan and the world community to new achievements.

Table 3 – Relationship matrix of Student Outcomes and Educational Program Objectives

Student Outcomes (Descriptors of knowledge, skills and competencies)		EPO 1. Apply knowledge of mathematics, science and technology, as well as identify, formulate and solve engineering problems to improve the technological processes of theoil and gas industry.	EPO 2. Effectively convey information and thoughts to other people.	EPO 3. Practice ethical, social, and environmental standards in their professions in a responsible manner.	EPO 4. Exhibit a high level of competence in engineering principles and practice.	EPO 5. Be able to work in diverse industry and multicultural teams.	EPO 6. Serve society, the oil and gas industry, the country through participation in professional communities and public organizations.	EPO 7. Be successful professionals, ready to lead a team, organization, the Republic of Kazakhstan and the world community to new achievements.
(a)	apply knowledge of mathematics, science and technology	✓			✓			✓

(b)	design and conduct experiments, and analyze and interpret data	✓			✓			
(c)	design a system, component or process	✓		✓	✓			
	to meet the desired needs within realistic constraints							
(d)	work in interdisciplinary teams		✓			✓	✓	
(e)	identify, formulate and solve technical problems	✓		✓				
(f)	understand professional and ethical responsibilities			✓	✓		✓	✓
(g)	communicate effectively		✓		✓	✓	✓	✓
(h)	understand the impact of technical solutions in a global, economic, environmental and social context			✓			✓	✓
(i)	recognize the need for lifelong learning and self-learning				✓			
(j)	know modern problems			✓	✓		✓	
(k)	use the techniques, skills and modern engineering tools required for engineering practice	✓			✓			

Table 3 shows the relationship between student outcomes and the reported EPO. The recommended way to interpret this table is to put before the EPO the expression "As Transmission networks and infrastructure graduates ..." followed by the EPO itself, and then put the expression "Students must be able to…" before each of the indicated outcomes. For example, in the case of EPO 4:

> As Transmission networks and infrastructure graduates to ***exhibit a high level of competence in engineering principles and practice,*** students must be able to *apply knowledge of mathematics, science and technology; design and conduct experiments, and analyze and interpret data; design a system, component or process to meet the desired needs within realistic constraints; understand professional and ethical responsibilities; communicate effectively; recognize the need for lifelong learning and self-learning; know modern problems; use the techniques, skills and modern engineering tools required for engineering practice.*

DESCRIPTORS OF LEVEL AND SCOPE OF KNOWLEDGE, SKILLSAND PROFESSIONAL COMPETENCIES

The Dublin Descriptors adopted in the Dublin Agreement and used in the national higher education standard are comparable, although not identical to criteria, procedures and results of educational programs of the Washington Agreement (1989). These agreements recognize the significant equivalence of accreditation systems, thereby recognizing the significant equivalence of educational programs accredited by the signatories of the agreement.

Thus, the Washington Agreement developed requirements for the professional competencies of engineers and named them as the attributes of the graduate: “The attributes of the graduate form a set of individually assessed learning outcomes that indicate the potential ability of the student to acquire the competencies necessary to perform professional engineering activities at the proper level. Graduate Attributesserve as an example of the requirements that a graduate of an accredited program must meet. The attributes are characterized by clear statements of expected abilities and, where necessary, ranges are provided to indicate the required level of achievement depending on the type of program. "

According to which the minimum level of required competencies is Student Outcomes (a) - (k). A more detailed description of the results of students for students under the " Transmission networks and infrastructure " program at KazNRTU named after K. Satpayev is given in Table 4.

At the lower end of the table, there are also descriptions of knowledge, skills and personal and professional competencies according to the industry qualifications framework. Since knowledge implies a basic minimum level compared to skills and competencies, theyare marked in white.

Such a classification of student outcomes is necessary in the future for clear detailing and comparison with the course outcomes, as noted in Fig. 1.

Table 4 – ABET competencies (Criterion 3. Student outcomes), Transmission networks and infrastructure educational program competencies' briefdescriptions and their relationship to the industry qualifications framework

ABET competencies (Criterion 3. Student outcomes)										
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
ability to apply knowledge in mathematics, science and technology	ability to design and conduct experiments, and analyze and interpret data	ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability	ability to work in interdisciplinary teams	ability to identify, formulate and solve technical problems	understanding of professional and ethical responsibility	ability to communicate effectively	extensive education required to understand the impact of technical solutions in a global, economic, environmental and social context	recognition of the need for lifelong learning and the ability to learn independently	knowledge of modern problems	ability to use the techniques, skills, and modern engineering tools required for engineering practice.
Transmission networks and infrastructure educational program competencies' brief descriptions										
Apply the methods and principles of engineering sciences to analyze and evaluate various elements, systems, processes of drilling, production and transportation and find the optimal	Understand the meaning, interpret and comment on the information received. Collect and organize a variety of information from multiple sources. Based on the information collected,	Use the fundamental sciences in modeling and calculating methods, modes of drilling oil and gas wells, operating and maintaining oil, gas, condensate production facilities, in designing the development of	The ability to correlate one's aspirations with the interests of other people and social groups; have the skills of working together in a group, the ability to find common goals, and contribute to a common cause. Be able	Be able to methodologically substantiate scientific research. To use the basic methods and techniques of scientific research and analysis of problems, which make it possible to distinguish facts from	Critically consider one or another aspect of the development of society, possess the ethics of labor and civil relations; have respect for the professional code of an engineer, a sense of intolerance for violations of the	The ability and readiness of the graduate to verbal communication in the professional (educational-professional) and official business spheres in compliance with all the norms of verbal	Analyze the current state of the domestic and world economy, oil and gas industry in a market economy, the ability to assess the adopted or accepted engineering decisions and their impact on public opinion.	Organize planning, analysis, reflection, self-assessment of their educational and cognitive activities; to formulate their own value orientations in relation to the studied subjects and the fields of	Be aware of the development of modern problems of technology and oil engineering in Kazakhstan and abroad, using the ability and possession of the methods of modern educational and information technologies.	Possess software skills in drilling, development, production, gathering and preparation of hydrocarbons, and oil and gas transportation, following the instructions of the management as part of a team of colleagues to participate in

(rational) conditions for their work.	identify trends, reveal causal relationships, determine goals, choose means, and put forward hypotheses and ideas. Collect and summarize field data necessary for drawing up projects for drilling, production, collection and preparation of hydrocarbons, and their further transportation onshore and offshore	oil and gas fields and in production activities. Know and comply with the basic principles of rational nature management and environmental protection rules during the operation and maintenance of oil, gas and condensate production facilities.	to deal with a variety of opinions, disagreements and conflicts, take into account the views of others, be able to negotiate and find compromises.	speculation, information from opinions, to propose alternative solutions based on the analysis of the current state, to remain open to new ideas, to demonstrate the ability to apply theoretical concepts in practice.	law. To give a legal and moral assessment of facts, events and actions (including your own). Assess social attitudes related to health, consumption and the environment.	communication : to state orally and in writing the results of their educational and research work; represent yourself, your university, region, country; fill out questionnaires, draw up applications, resumes, letters and other texts of an official business style; have the skills of interpersonal and group communication , public speaking, be able to ask questions, correctly conduct a dialogue, participate in discussions.		activity being mastered. Be able to be flexible in the face of rapid change. Through continuing education, strive to master new profiles of professional activity, expand professional opportunities. Make effective use of the labor market situation, act in accordance with personal and social benefit.		experimental research activities, to be able to compare, analyze and interpret the results of special software programs with alternative methods of obtaining data and with real data.
The industry qualifications framework for petroleum, refining and petrochemical industries 6-Level (Undergraduate)										
Characteristics of skills and abilities: 1) Solving	**Characteristics of skills and abilities:** 2)	**Characteristics of personal and professional competencies: 3) complexity** (process	**Characteristics of personal and professional competencies: 1)**	**Characteristics of skills and abilities:** 3) Abilities and	**Characteristics of personal and professional competencies:**	**Characteristics of personal and professional competencies: 2)responsibilit**	**Characteristics of knowledge:** 1) A wide range	**Characteristics of personal and professional competencies: 1) independence**	**Characteristics of knowledge:** 2) Independent	**Characteristics of skills and abilities:** 1) Solving

problems of a technological or methodological nature related to a certain area of knowledge, involving a choice from a variety of solutions.	Development, implementation, control, assessment and correction of technological process components	management, level of control / independence of execution, harmful and difficult working conditions, the use of complex equipment and technologies in the process of labor, work with partial or complete uncertainty).	**independence** (teamwork, focus on results, influence on the process, planning and organization / timeliness)	skills to carry out research and innovation activities to develop new knowledge and procedures for integrating knowledge of various fields, correctly and logically formulate your thoughts in written and oral form, apply theoretical knowledge in practice in a specific area	**2)responsibility** (labor safety and protection, development of subordinates, responsibility for quality, efficiency and timeliness of work)	**y** (labor safety and protection, development of subordinates, responsibility for quality, efficiency and timeliness of work)	of special (theoretical and practical) knowledge (including innovative).	(teamwork, focus on results, influence on the process, planning and organization / timeliness)	search, analysis and evaluation of professional information.	problems of a technological or methodological nature related to a specific area of knowledge, involving a choice from a variety of solutions (including innovative ones).

LNG108 – English
CREDITS – 5 (0/0/3/2)
PREREQUISITE – Diagnostic test

COURSE AIM AND OBJECTIVES

Provide students with the opportunity to acquire sufficient knowledge to become more free in their everyday social and academic settings. Students are working to improve pronunciation, vocabulary and grammar. Development of academic language skills. To teach students to work with texts, both audio and written, in their specialty. The discipline is a language style that is used when writing academic papers (paragraph, abstract, essay, presentation, etc.) This course is designed to help students become more successful and effective in their learning, developing critical thinking skills and independent learning.

SHORT DESCRIPTION OF THE COURSE

The courses are designed to teach English to university students who need English for work and communication. The courses are multi-level with the following levels: Beginner English, Elementary English, General English I, General English II, Academic English, Business English, Professional English

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	**Criteries 3. Student's outcomes**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Know the basics of grammar and apply	✓										
Formulate a topic, determine the linguistic means of organizing the text and use them when producing your own speech works			✓	✓							
Know about the methods and techniques of linguosemantic analysis of a scientific text	✓										
Distinguish the features of the compositional and semantic organization of a scientific text					✓				✓		
Determine the types, volume and types of additional scientific information contained in the text			✓								
Organize and participate in discussions on familiar topics, ask them to repeat and explain some words and phrases.						✓			✓		
Recognize, analyze grammatical structures and vocabulary of academic English in the text	✓				✓			✓			

LNG1042-1041 - Kazakh/Russian
CREDIT - 5 (0/0/3/2)
PREREQUISITE - diagnostic test

COURSE AIM AND OBJECTIVES

- To teach students to listen to statements on well-known topics related to home, study, free time;
- Understand texts on personal and professional topics containing the most frequent words and expressions;
- Be able to conduct a conversation on everyday topics; describe your experiences; express your opinion; retell and evaluate the content of the book you read, the movie you saw;
- Be able to create simple texts on well-known topics, including those related to professional activity.

SHORT DESCRIPTION OF THE COURSE

The language material of the course is selected in such a way that the student, assimilating the lexical and grammatical minimum, had the opportunity to get acquainted with typical communicative situations and find himself in such situations, was able to correctly evaluate them and choose the appropriate model (strategy) of speech behavior.

The main emphasis of learning is transferred from the process of knowledge transfer to learning the ability to use the language being studied during the implementation of various types of speech activities, such as reading (provided that the reading is understood), listening (under the same condition) and the production of texts of a certain complexity with a certain degree of grammatical and lexical correctness.

The material for classes is selected so that students, while studying the Kazakh/ Russian language, acquire reading, writing and understanding skills of sounding speech on the basis of simultaneous mastering the basics of grammar (phonetics, morphology and syntax) and word usage during constant repetition with gradual complication of tasks.

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	Criteries 3. Student's outcomes										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Know the basics of grammar and apply	✓										
Formulate a topic, determine the linguistic means of organizing the text and use them in the production of their own speech works			✓	✓							
Know about the methods and techniques of linguosemantic analysis of a scientific text	✓										
To distinguish the features of the compositional and semantic organization of a scientific text					✓				✓		
Determine the types, scope and types of additional scientific information embedded in the text			✓								

PET103 - Introduction to major (Basics of Oil and Gas Business)
CREDIT - 5 (1/0/2/2)
PREREQUISIT - no

AIM AND OBJECTIVES OF THE COURSE

This course provides general information about the oil and gas industry and its components: geological and geophysical prospecting for oil and gas fields, drilling oil and gas wells, development and operation of oil and gas fields, collection and preparation of well products, oil and gas transportation, oil and gas processing. At the end of the course, students will have an idea of: the structure of oil and gas fields, equipment and technological operations for drilling, production, collection and preparation, transportation and processing of oil and gas.

BRIEF DESCRIPTION OF THE COURSE

An introduction to the basic concepts and concepts of petroleum engineering, covering topics such as drilling and completions, oilfield development, surface gathering and treatment, transportation and storage.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Describe the basis of the earth's structure, the geochemical cycle of carbon, rock types, classification of sedimentary rocks, tectonic actions			✓								
Describe the oil reservoir and its components, trap elements and their formation, parent rocks, temperature and maturity of organic rocks, maturity of the parent rocks, primary and secondary migration			✓		✓						
Understand the basic procedures and roles of all systems used in drilling					✓						
Development of understanding of various aspects in drilling operations, difficulties associated with the analysis and synthesis of various technical problems encountered during drilling operations			✓		✓						
Understand the basic concepts for the					✓						
development of oil fields, as well as methods and technologies of oil production											
Know the basic properties of reservoir rocks and fluids, know the methods of their calculation and measurement	✓				✓						
Analyze the main elements in the design and optimization of the mining process		✓	✓								

Demonstrating and understanding the difference between risks and uncertainties and their impact on decision making in the oil and gas industry	✓							✓	✓	✓	
Applying critical thinking and problem-solving skills to petroleum engineering problems	✓							✓			
Applying theoretical and practical skills to analyze petroleum engineering data				✓				✓	✓		

PHY111 – Physics I
CREDITS – 5 (1/1/1/2)
PREREQUISITE – No

COURSE AIM AND OBJECTIVES

The main purpose of teaching the Physics I course is to form ideas about the modern physical picture of the world and the scientific worldview.

SHORT DESCRIPTION OF THE COURSE

The discipline of Physics I is the basis of theoretical preparation for engineering and technical activities of graduates of the higher technical school and represents the core of physical knowledge necessary for an engineer operating in the world of physical laws. The course "Physics 1" includes sections: physical fundamentals of mechanics, the structure of matter and thermodynamics, electrostatics and electrodynamics.

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	**Критерий 3. Результаты обучающихся**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Understand the basic physical phenomena and the basic laws of physics, the limits of their applicability, the possibilities of use in practical applications	✓	✓									
Know the basic physical quantities and physical constants, their definition, meaning, units of their measurement	✓			✓	✓						
Analyze and explain natural phenomena and technogenic effects from the standpoint of fundamental physical concepts			✓	✓					✓		
Use the basic concepts, laws and models of physics, operate with them to solve applied problems.		✓				✓					
To substantiate which laws describe this phenomenon or effect, to highlight the physical content in applied problems, to search and systematize relevant information					✓				✓		
Compare the meaning of physical quantities and concepts	✓			✓				✓			

MAT101- Mathematics I
CREDITS – 5 (1/0/2/2)
PREREQUISITE – no

COURSE AIM AND OBJECTIVES

The main goal of the course is to give the future specialist a certain amount of knowledge in the sections of the course "Mathematics-I", which is necessary for the study of related engineering disciplines. Introduce students to the ideas and concepts of calculus. The main attention is paid to the formation of basic knowledge and skills with a high degree of understanding of differential and integral calculus. The objectives of the course are the acquisition of knowledge necessary for the effective use of rapidly developing mathematical methods; obtaining the skill of building and researching mathematical models; possession of the fundamental sections of mathematics, necessary for solving scientific research and practical problems in the professional field.

SHORT DESCRIPTION OF THE COURSE

The course "Mathematics-I" provides a presentation of the sections: introduction to analysis, differential and integral calculus

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

Course outcomes	**Criterion 3. Student outcomes**										
Upon completion of the course, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Know linear algebra and analytic geometry			✓								
Apply the theory of differential equations and systems of differential equations, numerical and functional series	✓							✓			
Analyze the theory of functions of a complex variable, the theory of probability and mathematical statistics						✓	✓				
Analyze analytic geometry									✓	✓	
Apply methods for solving problems of planimetry and stereometry using analytical geometry			✓								
Distinguish between cartesian and polar coordinate systems					✓						

GEN177 –Engineering and computer graphics
CREDITS – 5 (1/0/2/2)
PREREQUISITE – No

COURSE AIM AND OBJECTIVES

Training in the use of modern information technologies in the field of professional activity. The objectives of the course include:
- Teach how to work with software interfaces of operating systems;
- To reveal the concepts of data formats and multimedia content. To teach how to work with typical

multimedia data processing applications. Use modern approaches of presentation of the material;

SHORT DESCRIPTION OF THE COURSE

The course develops the following skills among students: to depict all possible combinations of geometric shapes on a plane, to carry out research and their measurements, allowing for image transformations; to create technical drawings, which are the main and reliable means of information that provides communication between the designer and the designer, technologist, builder. Introduces students to the basics of automated preparation of the graphic part of design documents in the AutoCAD environment.

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	**Criteries 3. Student's outcomes**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
To know all possible combinations of geometric shapes on the plane, to conduct research and their measurements, allowing for image transformations;	✓										
Create technical drawings that provide communication between the designer and the designer, technologist, builder.		✓						✓	✓		
Explain the work of modern tools with data of various nature and purpose		✓			✓						
Apply the graphic part of design documents in the AutoCAD environment.	✓		✓					✓			

HUM129 – Cultural studies
CREDITS – 2 (1/0/0/1)
PREREQUISITE – No

COURSE AIM AND OBJECTIVES

The purpose of studying the discipline is to familiarize students with the cultural achievements of mankind, to understand and assimilate the basic forms and universal laws of the formation and development of culture, to develop their aspirations and skills to independently comprehend the wealth of values of world culture for self-improvement and professional growth.

SHORT DESCRIPTION OF THE COURSE

The course of cultural studies examines the general problems of the theory of culture, the leading cultural concepts, universal patterns and mechanisms of formation and development of culture, the main historical stages of the formation and development of Kazakh culture, its most important achievements.

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	Criteries 3. Student's outcomes										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Know the general problems of the theory of culture	✓										
Know the leading cultural concepts			✓		✓						
Analyze the main historical stages of the formation and development of Kazakh culture	✓					✓					
Operate with historical concepts						✓			✓		
Analyze complex historical events and predict their further development			✓	✓							

HUM100 – Modern History of Kazakhstan
CREDITS – 5 (1/0/2/2)
PREREQUISITE – No

COURSE AIM AND OBJECTIVES

- The aim of the course is to familiarize students of technical specialties with the main theoretical and practical achievements of domestic historical science on the problems of the history of modern Kazakhstan, a comprehensive and systematic study of the main stages of the formation anddevelopment of Kazakhstani society.
- Analyze the features and contradictions of the history of Kazakhstan during the Soviet period;
- To reveal the historical content of the foundations of the laws of political, socio-economic, cultural processes at the stages of the formation of an independent state;
- Promote the formation of students' citizenship;
- To educate students in the spirit of patriotism and tolerance, belonging to their people, the country;

COURSE DESCRIPTION

The course Modern history of Kazakhstan is an independent discipline and covers the period from the beginning of the twentieth century to the present day. The modern history of Kazakhstan studies the national liberation movement of the Kazakh intelligentsia at the beginning of the 20th century, the period of creation of the Kazakh republic, as well as the process of formation of a multinationalsociety.

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	Criteries 3. Student's outcomes										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**

Know the events, facts and phenomena of the Modern history of Kazakhstan	✓										
Know the history of ethnic groups inhabiting Kazakhstan			✓		✓						
Analyze the main stages of the formation of Kazakh statehood	✓					✓					
Work with historical concepts						✓			✓		
Analyze complex historical events and predict their further development			✓	✓							

PHY464 – "Electromagnetism. Optics"
CREDITS – 5 (1/1/1/2)
PREREQUISITE – No

COURSE AIM AND OBJECTIVES

The main purpose of teaching the course "Electromagnetism. Optics" consists in the formation of ideas about the modern physical picture of the world and the scientific worldview.

SHORT DESCRIPTION OF THE COURSE

Discipline "Electromagnetism. Optics" is a logical continuation of the study of the discipline "Physics 1", and forms a holistic view of the course of general physics as one of the basic components of the general theoretical training of bachelors of engineering and technical profile. The discipline "Physics II" includes sections: magnetism, optics, nanostructures, fundamentals of quantum physics, atomic and nuclear physics.

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	**Criteries 3. Student's outcomes**										
Upon completion of the discipline, studentsshould be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Understand the basic physical phenomena and the basic laws of physics, the limits of their applicability, the possibilities of use in practical applications	✓	✓									
Know the basic physical quantities and physical constants, their definition, meaning, units of their measurement	✓			✓	✓						
Analyze and explain natural phenomena and technogenic effects from the standpoint of fundamental physical concepts			✓	✓					✓		
Use the basic concepts, laws and models of physics, operate with them to solve applied problems.		✓				✓					

To substantiate which laws describe this phenomenon or effect, to highlight the physical content in applied problems, to search and systematize relevant information					✓				✓		
Compare the meaning of physical quantities and concepts	✓			✓				✓			

MAT102- Mathematics II
CREDITS – 5 (1/0/2/2)
PREREQUISITE – Math I

COURSE AIM AND OBJECTIVES

The goal of the "Mathematics II" is to form understandings about modern mathematics as a whole as a logically harmonious system of theoretical knowledge.
The objectives of the course are to instil solid skills in solving mathematical problems with bringingthe solution to a practically acceptable result. To develop primary skills in mathematical research of applied issues and the ability to independently understand the mathematical apparatus contained in the literature related to the student's specialty.

COURSE DESCRIPTION

The course "Mathematics-II" provides an accessible presentation of sections: elements of linear algebra and analytic geometry, differential calculus of functions of many variables, multiple integrals. "Mathematics II" is a logical continuation of the course "Mathematics I".

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	**Criteries 3. Student's outcomes**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Apply functions in the form of power series and Fourier series			✓								
Apply series in approximate calculations (definite integrals and solving Cauchy problems) with an estimate of the errors allowed in this case	✓							✓	✓		
Estimate the probabilities of random events and work with random variables and functions from them					✓						✓
Apply methods for solving differential equations by numerical methods (Euler's method) and using the operational method			✓	✓							

Differentiate functions of one and several variables, calculate definite integrals of functions of one and several (double, triple integrals) variables, both in Cartesian and in orthogonal curvilinear coordinates							✓		✓		

HUM128 – Political Science
CREDITS – 2 (1/0/0/1)
PREREQUISITE – No

COURSE AIM AND OBJECTIVES

The aim of the course is to form students' systematic knowledge about the political sphere of public life, a consistent and comprehensive study of the origins and evolution of the political thought of the Kazakh people at a long stage of its historical development on the materials of its richest spiritual culture, political heritage and its most prominent representatives.

SHORT DESCRIPTION OF THE COURSE

The study of the discipline "Political Science" makes it possible to determine the place of the systematic approach in the methodology of the study of politics and the regime of government; to reveal its specifics; to analyze the main provisions of the theory of systems and the theory of the political system; to form scientific ideas about the structure, principles, functions of the political system, the mechanism of its functioning; to identify factors contributing to the legitimacy, stability, adaptation of the political system; to study modern models of political systems; to analyze the main types of political regime, their varieties; to form the ability to analyze the features of the development of the political system and the political life of the peoples and states of the Republic of Kazakhstan, their transition to democracy

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	**Criteries 3. Student's outcomes**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Know the general problems of the theory of culture	✓										
Know the leading cultural concepts			✓		✓						
Analyze the main historical stages of the formation and development of Kazakh culture	✓					✓					
Operate with historical concepts						✓			✓		
Analyze complex historical events and predict their further development			✓	✓							

CHE495 – General chemistry
CREDIT – 5 (1/1/1/2)
PREREQUISITE – no

AIM AND OBJECTIVES OF THE COURSE

The aim of studying the discipline is the fundamental preparation of students in chemistry, contributing to the preparation of the student for interdisciplinary experimental research activities aimed at creating competitive products based on the use of modern methods and design tools, mathematical, physical and computer modeling of technological processes.

BRIEF DESCRIPTION OF THE COURSE

The chemistry course is designed to form an understanding of the basic concepts and laws of chemistry, the properties of organic and inorganic substances, chemical reactions and how to control them.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Understand basic chemical phenomena and basic laws of chemistry; the limits of their applicability, the application of laws in the most important practical applications;			✓								
Describe the main chemical quantities and chemical constants, their definition, meaning, methods and units of their measurement;			✓		✓						
Know chemical experiments and their role in the development of science; the purpose and principles of operation of the most important physical and chemical devices.					✓						
Explain the main observed natural and man-made phenomena and effects from the standpoint of chemical interactions;			✓		✓						
Understand the meaning of chemical quantities and concepts; write down the equations of chemical reactions;					✓						
Work with instruments and equipment of a chemical laboratory; use various techniques for processing experimental data.	✓				✓						
Master the use of basic chemical laws and principles in critical practical applications;		✓	✓								

Possess the use of basic methods of chemical analysis for solving natural science problems; correct operation of the main instruments and equipment of the chemical laboratory;	✓							✓	✓	✓	
processing and interpretation of the results of the experiment.											
Apply critical thinking and problem-solving skills to petroleum engineering problems	✓							✓			
Apply theoretical and practical skills to analyze petroleum engineering data				✓				✓	✓		

HUM132 – Philosophy
CREDITS – 5 (1/0/2/2)
PREREQUISITE – No

COURSE AIM AND OBJECTIVES

The aim of the course is the formation of cognitive, rational, communicative, self-educational competencies, the tasks are:
- Promote the development of adequate world outlook guidelines in the modern world;
- To form creative and critical thinking in students;
- Distinguish the ratio of spiritual and material values, their role in the life of a person, society and civilization;
- Contribute to the definition of their attitude to life and the search for harmony with the surrounding world.

SHORT DESCRIPTION OF THE COURSE

"Philosophy" is the formation of a holistic worldview that has developed in the context of the socio-historical and cultural development of mankind. Acquaintance with the main paradigms of the methodology of teaching philosophy and education in the classical and post-classical traditions of philosophy. Philosophy is called upon to develop stable life guidelines, the acquisition of the meaning of one's being as a special form of spiritual production. Contributes to the formation of a moral character of a person with the ability to critical and creative thinking. The theoretical sources of this course are the concepts of Western, Russian, Kazakh scientists on the history and theory of philosophy.

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	**Criteries 3. Student's outcomes**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Know the basic terms, main concepts and problems of philosophy	✓										
Distinguish the main philosophical ways of solving worldview issues in the context of culture			✓		✓						

Analyze the history of the development of philosophical thought											
Determine alternative ways of posing and solving worldview issues in the history of human development			✓					✓			
Identify the main theoretical approaches in the relationship of a person with society		✓			✓						
Discuss and make rational decisions				✓				✓			

CHE451 - Life safety
CREDIT - 2 (1/0/0/1)
PREREQUISITE - No

AIM AND OBJECTIVES OF THE COURSE

The purpose of the discipline "Life Safety" is to form students' ability to recognize and evaluate negative factors of the human environment

BRIEF DESCRIPTION OF THE COURSE

Students will study the consequences for humans of harmful and damaging factors, ways to implement reliable ways to protect against them, choosing the optimal solution and correct behavior, safety and preservation of life in emergency situations of a natural, man-made and social nature

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Know the harmful and damaging factors of the human environment	✓										
Be able to recognize and evaluate negative factors			✓								
Be able to implement reliable ways to protect against them					✓						
Analyze the causes of harmful and damaging factors		✓									
Evaluate and make optimal decisions and correct behavior					✓						

MAT103- Mathematics III
CREDITS – 5 (1/0/2/2)
PREREQUISITE – Math I, Math II

COURSE AIM AND OBJECTIVES

The goal of the course "Mathematics-III" is the formation of basic knowledge and skills with a high degree of understanding of the sections of the course, helping to analyze and solve theoretical and practical problems.

Objectives of the course: instilling in students the ability to independently study educational literature, to carry out probabilistic-theoretical and statistical analysis of applied problems; development oflogical thinking and raising the general level of mathematical culture.

COURSE DESCRIPTION

The course "Mathematics-III" includes sections: the theory of series, elements of the theory of probability and mathematical statistics and is a logical continuation of the discipline "Mathematics II".

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	**Criteries 3. Student's outcomes**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Apply number series theory	✓										
Understand and compare the results of the theory of function series							✓	✓			
Apply Fourier Series to Industry Problems		✓									
Compare elements of probability theory and mathematical statistics						✓					
Evaluate problems in all sections of series theory						✓		✓			
Analyze different probabilities of events and draw conclusions				✓							
Classify numeric characteristics of random variables		✓			✓						
Use statistical methods to process experimental data								✓			

HUM122 – Psychology
CREDITS – 2 (1/0/0/2)
PREREQUISITE – No

COURSE AIM AND OBJECTIVES

The purpose of the discipline is to study fundamental concepts in the field of general psychology. The general idea of psychology as a science, methodology and methods of psychology are considered. The discipline contributes to the formation of a holistic view of a person's personal characteristics as a factor of success in mastering and implementing their educational and professional activities, the ability to make decisions more effectively based on knowledge of the psychological nature of a person and society. The possibility of using the studied methods in the future professional activity of students is considered.

SHORT DESCRIPTION OF THE COURSE

The object of the discipline is the mental processes, properties and states of a person in various fields of human activity, interpersonal and social interactions, ways and forms of their organization and changes under external influence.

During the course, students acquire theoretical knowledge, practical skills and abilities, forming their professional orientation from the perspective of psychological aspects.

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	**Criteries 3. Student's outcomes**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
To know the mental processes, properties and conditions of a person in various fields of human activity	✓										
Be able to recognize and evaluate interpersonal and social interactions					✓						
Know the ways and forms of interpersonal and social interactions of organization and change	✓										
Analyze the causes of conflicts in various fields of human activity		✓							✓		
Evaluate and make optimal decisions from the perspective of psychological aspects						✓					

MNG487 - Fundamentals of Entrepreneurship, leadership and anti-corruption culture
CREDITS – 3 (1/0/1/1)
PREREQUISITE – No

COURSE AIM AND OBJECTIVES

The purpose of the discipline is to gain practical skills in entrepreneurial activity, familiarization with the theories and types of leadership, and understanding the basics of anti-corruption culture.

SHORT DESCRIPTION OF THE COURSE

Students will study the theory and practice of entrepreneurship as a system of economic, organizational and legal relations of business structures. They will develop their leadership and teamwork skills. They will also study the causes of corruption and methods to combat it.

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	Criteries 3. Student's outcomes										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
To know the theory and practice of entrepreneurship as a system of economic, organizational and legal relations of business structures						✓					
Be able to develop their leadership and teamwork skills.							✓				
Analyze the causes of corruption and methods to combat it.									✓		
Assess uncertainties in risk assessment											✓
Integrate social, political, cultural and environmental factors into the decision-making process.								✓	✓	✓	

GEN408 - Resistance of materials
CREDITS – 5 (1/1/1/2)
PREREQUISITE – Physics I

COURSE AIM AND OBJECTIVES

The purpose of the discipline is the theoretical and practical training of future specialists in the field of technology of transport processes to the extent necessary for the correct solution of the problems of calculating the strength, rigidity and stability of structural elements used in difficult operating conditions under the influence of both static and dynamic loads, the rational purpose of structural materials and the shape of the cross-section, providing the required indicators of reliability, safety, economy and efficiency of the structure.

SHORT DESCRIPTION OF THE COURSE

The object of the discipline is Stretching and compression, Stresses in cross sections and deformations of a straight rod, Mechanical properties of materials under tension and compression. Calculation of strength and stiffness in tension-compression. Geometric characteristics of flat sections. Shear and torsion. Calculation of strength and torsional stiffness. Bend. Normal and tangential bending stresses. Calculation of bending strength. Theory of stressed and deformed states. The limit state hypothesis. Complex resistance. Stability of the equilibrium of deformable systems. Dynamic load.

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	Criteries 3. Student's outcomes										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**

To know the main tasks and possibilities of the science of the resistance of materials			✓								
Know the principles of drawing up calculation schemes					✓						
To know the main tasks and possibilities of the science of the resistance of materials		✓									
Be able to apply methods for calculating structural elements for strength, rigidity and stability		✓									
Evaluate and analyze the results obtained by engineering calculations											✓

GIG101 – Engineering Geology
CREDITS – 5 (2/1/0/2)
PREREQUISITE – No

COURSE AIM AND OBJECTIVES

Acquisition of theoretical knowledge about 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 in order to predict their changes during economic development.

SHORT DESCRIPTION OF THE COURSE

Engineering and geological properties of rocks. The concept and characteristics of soils. Engineering and geological zoning. Methods of engineering-geological research, engineering-geological research for different types of construction. Principles of monitoring exogenous geological processes. Regional engineering geology.

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	**Criteries 3. Student's outcomes**										
Upon completion of the discipline, studentsshould be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**

CSE677 – Information and communications technologies
CREDITS – 5 (2/1/0/2)
PREREQUISITE – No

COURSE AIM AND OBJECTIVES

Training in the skills of applying modern information technologies in the field of professional activity. The objectives of the course include:
- To reveal the basic concepts of the architecture of computer systems;

- To reveal the basic concepts of information and communication technologies and subject terminology;
- To teach to work with software interfaces of operating systems;
- To teach how to work with data in a different presentation, both tabular structured and unstructured form;
- Teach to apply the basic principles of information security;
- To reveal the concepts of data formats and multimedia content. To teach how to work with typical applications for processing multimedia data. Use modern approaches to material presentation;
- To reveal the concepts of modern social, cloud and email platforms, and how to work with them;
- To teach how to use algorithms and programming methods to solve problems of automating business processes.

SHORT DESCRIPTION OF THE COURSE

The course contains a training program aimed at leveling the basic knowledge of students in the field of information and communication technologies. Contains a full range of topics with a predominance of training practical skills in working with data, algorithms and programming. The course is designed in such a way as to teach students not only the basic concepts of architecture and modern infrastructureof information and communication technologies, but also to teach how to use these tools to solve applied problems. To teach how to optimize processes, apply adequate models and methods for solvingpractical problems using modern methods and tools of information technology, automate routine processes, be productive and efficient.

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	**Criteries 3. Student's outcomes**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Know the architecture of computing systems and information communications technology infrastructure	✓										
Compare interfaces of modern operating systems		✓						✓	✓		
Distinguish between types of information security threats, principles, tools and methods of data protection			✓			✓			✓		
Explain how modern tools work with data of various types and purposes		✓			✓						
Program in an algorithmic programming language;					✓				✓		✓
Analyze, model, design, implement, test and evaluate information and communication technology systems			✓			✓					✓
Apply modern social, cloud, email platforms to organize business processes	✓		✓					✓			

HUM127 - Sociology
CREDITS – 5 (1/0/2/2)
PREREQUISITE – No

COURSE AIM AND OBJECTIVES

The main purpose of the course "Sociology" is to form students' understanding of sociology as an academic and applied discipline - mastering the system of basic sociological concepts, mastering the basic methods of empirical sociology, familiarization with the application of sociological approaches to the study of social phenomena and processes. The study of the basics of sociology plays an important role from the point of view of personal development and socialization, helps students to scientifically comprehend complex phenomena and processes of social life, their essence, content, dynamics of development, as well as to understand existing sociological theories that explain these social phenomena and processes and reveal the mechanisms of their research.

SHORT DESCRIPTION OF THE COURSE

Background and socio-philosophical prerequisites of sociology as a science. Classical sociological theories. Society and social institutions. Social groups and communities. Types of communities. Small groups and collectives. Social movements. Social interaction and social relations. Interaction of economy, social relations and culture. Social changes. Methods of sociological research

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	Criteries 3. Student's outcomes										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Know the socio-philosophical prerequisites of sociology			✓								
Know the principles of the organization of society and its social institutions		✓									
Be able to analyze the interaction of economics, social relations and culture								✓			
Apply research methods to analyze the interaction of society and personality								✓			
Be able to apply the methods of sociological research		✓									

CHE452 - Ecology and sustainable development
CREDITS – 2(1/0/0/1)
PREREQUISITE – No

COURSE AIM AND OBJECTIVES

The purpose of the course is to form an idea of the basic laws of sustainable development of nature and society.

SHORT DESCRIPTION OF THE COURSE

The course examines the ecology of individuals, populations and communities, biogeocenosis. Ecosystem. The biosphere and its stability. Principles of sustainable development. Modern global and topical environmental problems of Kazakhstan and ways to solve them. The best available technologies as effective ways of sustainable development. Overview of advanced domestic industries, ways and means of protecting the environment from the negative impact of human production activities.

COURSE OUTCOMES: KNOWLEDGE, SKILLS AND ABILITIES

Course outcomes – student outcomes matrix

COURSE OUTCOMES	**Criteries 3. Student's outcomes**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Know the socio-economic aspects of ecology			✓								
Know the principles of sustainable development.		✓									
Be able to analyze the causes of modern environmental problems in Kazakhstan					✓						
Apply the best available technologies for sustainable development.					✓						
Be able to apply environmental monitoring methods		✓									

MAP100 - Fundamentals of Engineering Geodesy
CREDIT – 5 (1/0/2/2)
PREREQUISIT – no

COURSE AIM AND OBJECTIVES

Acquisition by students of theoretical and practical knowledge of engineering and geodetic works during surveys, design, construction and operation of the main pipeline, to have an idea of geodetic methods and works.

SHORT DESCRIPTION OF THE COURSE

Principles of engineering and geodetic works, taking into account technical and technological, transport, environmental and regulatory components. The study of the discipline will make it possible to familiarize bachelors with the methods of geodetic measurements and works that are used in the construction and operation of the main pipeline, taking into account regulatory and technical conditions, the introduction of new technologies for construction and installation work, the use of computer and automated processing in geodesy.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

The discipline is devoted to engineering and geodetic works carried out during surveys, design and construction of buildings and structures. The methods of production of center work, executive surveys, geodetic support for the construction of buildings, roads and railways, hydraulic structures, bridges, pipelines, power lines and communications are described. The information on standardization, provision and quality control of construction in terms of its geometric parameters, as well as general requirements for occupational health and safety when performing geodetic works are given.

Course outcomes – student outcomes matrix

COURSE OUTCOMES	**Criteries 3. Student's outcomes**										
Upon completion of the discipline, studentsshould be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Determine the stages of engineering and geodetic works during the survey, design and construction of the main pipeline	✓										
Apply modern tools and instruments for geodetic measurements										✓	✓
To compare and analyze the main modern methods of engineering and geodetic works, taking into account feasibility studies		✓									
Explain the methods of engineering and geological work with information databases for the preparation of calculations, justifications of calculation options and the choice of a rational method					✓		✓	✓			
Systematize, generalize and analyze information for the design of the main pipeline		✓								✓	✓
To substantiate and propose an effective method of engineering and geodetic works taking into account the accepted general schemes and projects of the main pipeline		✓		✓			✓				
Apply methods, analysis in the management of geodetic databases		✓						✓			
Demonstrate the skills of drawing up geodetic maps in project documents using specialized software systems.		✓		✓			✓				

PET409 - Thermodynamics and Heat Engineering
CREDIT – 5 (1/0/2/2)
PREREQUISIT – PHY112

COURSE AIM AND OBJECTIVES

The purpose of the course: the formation of students' fundamental knowledge on the assessment of the basic methods of transformation and transmission of energy, which are the basics of creating technologies for thermal effects on oil reservoirs, maintaining reservoir pressure in oil, gas, and gas condensate fields and processing the bottomhole zone of oil and gas wells, and designing thermal installations in the oil and gas industry.

The main objective of the course is to study the laws of thermal movement and its transformation into other types of movement and methods of obtaining heat, converting it into other types of energy, distribution, transportation, use of heat using heat machines, apparatus, and equipment in the oil and gas industry.

SHORT DESCRIPTION OF THE COURSE

The discipline describes the basic laws and design relationships of thermodynamics and heat transfer, the principle of operation of the working processes of heat engines, heat power plants, refrigeration machines, and steam generators.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course outcomes – student outcomes matrix

Course outcomes	**Criterion 3. Student outcomes**										
Upon completion of the course, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Understand the basic laws and design relationships of thermodynamics and heat transfer,			✓								
Describe the purpose, composition, and properties of working bodies of heat engines and refrigerating machines,			✓		✓						
Know the basics of determining the thermodynamic and thermophysical properties of gases, liquids, and solids					✓						
Know the principles of operation of heat and power and heat exchangers.			✓		✓						
Perform calculations and analysis of thermodynamic processes in energy technology equipment.	✓				✓						
Perform calculations and analysis of the temperature regimes of systems and equipment for production, transport, storage, and processing of hydrocarbons,		✓	✓								

Understand and apply the obtained theoretical knowledge in the development of special	✓							✓	✓	✓	
disciplines in the oil and gas direction.											
Understand and use the methods of drawing up energy and heat balances of energy technological processes in the oil and gas industry,	✓							✓			
Know the methods of calculating the thermal conditions of systems and equipment.				✓				✓	✓		

PET410 - Fluid and Gas Mechanics
CREDIT - 5 (1/1/1/2)
PREREQUISITE - PHY111 Physics I

AIM AND OBJECTIVES OF THE COURSE
Studying methods of calculation, analysis, design of hydraulic and gas systems, development of engineering calculation skills and mastering the technique of solving basic problems.

BRIEF DESCRIPTION OF THE COURSE
Continuous fluid model; ways of setting the motion of a continuous medium; decomposition of the motion of an elementary volume of a continuous medium into quasi-solid and deformation; mass conservation law and continuity equation; distribution of forces in a continuous medium; the law of change in the quantities of motion and the equations of dynamics in stresses; the law of moments and symmetry of the stress tensor; the law of kinetic energy change and the general law of conservation of energy in continuum mechanics.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Know the conservation equations on which the theoretical study of hydromechanics is based;			✓								
Be able to investigate the movement of liquids and gases by physical and mathematical methods;			✓		✓						
Possess the theoretical foundations of fluid and gas mechanics.					✓						
Know the principles of classification of oils and gases;			✓		✓						
Describe the properties and patterns of behavior of oil as a dispersed system.					✓						
Be able to use knowledge of oil and gas properties in appropriate calculations.	✓				✓						

Master the methods of studying the mechanical properties of oil and gas.		✓	✓								
To be able to apply the fundamental laws of nature (conservation of mass, energy, momentum, etc.) to establish the basic laws of motion of liquids and gases.	✓							✓	✓	✓	
Apply the basic laws of fluid and gas mechanics to calculate the definition of head loss	✓							✓			

GEO409- Soil Science and Soil Mechanics
CREDITS – 5 (2/1/0/2)
PREREQUISITE – no

AIM AND OBJECTIVES OF THE COURSE

Formation of students' knowledge of the basics of soil science and soil mechanics in the aspect of practical application in professional activity.

BRIEF DESCRIPTION OF THE COURSE

This course covers the study of the fundamental principles of soil science and soil mechanics, starting with the composition and structure of soils, mechanics of solid bodies. Students learn to use software to determine the strength of soils.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline, studentsshould be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Explain the basics of soil science and soil mechanics in the process of production activity	✓										
To determine the deformability of soils and their massifs, to conduct an analysis for the engineering-geological cycle	✓				✓						✓
To determine the physical and mechanical properties of soils, and the influence of the material composition, structure and texture on strength, deformation properties and stability	✓		✓		✓						✓
Determine the work of the soil in various structures and conditions to prevent accidents and destruction of buildings and structures	✓		✓		✓						✓

It can be used to solve problems in the construction of trunk pipelines, underground gas storage	✓				✓						✓
Skills of working on modern laboratory equipment, methods of processing the results obtained and methods of data interpretation using digital technologies	✓				✓						✓
Effectively present the results of the engineering study in a written report.							✓				

PET401 - Diagnostics and testing of oil and gas facilities
CREDITS – 5 (1/1/1/2)
PREREQUISITE – no

AIM AND OBJECTIVES OF THE COURSE

Formation of students' basic knowledge about diagnostics and testing of trunk pipelines during its construction and operation.

BRIEF DESCRIPTION OF THE COURSE

Methods of diagnostics and testing of trunk pipelines for safe and reliable operation of the trunk pipeline. Methods of diagnostics and testing of the main pipeline. Implementation of a set of measures to improve the diagnostics of the main pipeline. Fundamentals of the application of diagnostic examination results to solve corrosion and defect problems of the main pipeline pipe. Review of modern improvements and research.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline, studentsshould be able to	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Explain the main methods of diagnostics and testing of the main pipeline	✓	✓									✓
To evaluate the results of the diagnostic examination of the main pipeline	✓	✓									
To determine the methods of testing the main pipeline	✓							✓			
Demonstrate the objectives, types and basic principles of the diagnostic examination of the main pipeline								✓		✓	
Distinguish methods of diagnostic examination of the main pipeline				✓						✓	✓
Explain the quality control and safety of the work		✓			✓						✓

To list and explain the methods of diagnostics of the main pipeline		✓			✓						
Apply the schedule of diagnostic work in terms of preventive repairs of the main pipeline		✓						✓			
Explain the quality and safety control of hydraulic and pneumatic testing of the main pipeline				✓			✓	✓			

PET402 - Engineering calculation approaches in the oil and gas industry
CREDITS – 5 (1/1/1/2)
PREREQUISITE – no

AIM AND OBJECTIVES OF THE COURSE

The purpose of this course is to develop students' practical skills in applying quantitative and qualitative methods in modeling and designing objects.

BRIEF DESCRIPTION OF THE COURSE

This discipline covers the basic methods of statistics, including quantitative and qualitative methods that are necessary for modeling and designing objects, making engineering, organizational, technological and managerial decisions. Applied engineering tasks are considered in order to form ideas about current trends in the industry.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline, studentsshould be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
To differentiate the main areas of application of engineering calculation methods: geological and geophysical processes of prospecting and exploration; extraction and lifting of oil and gas; transportation by pipeline; technological processes of processing	✓							✓			✓
Analyze and synthesize technological systems of the oil and gas industry for projected and existing production facilities;	✓	✓									
To conduct a study of the dynamic behavior of technological systems for the synthesis of control systems;		✓			✓						

Manage computer training systems for oil and gas production operators.				✓							✓

PET428 - Design and operation of pumping and compressor stations
CREDITS –5 (1/0/2/2)
PREREQUISITE - PET133 Thermodynamics and Heat Engineering

AIMS AND OBJECTIVES OF THE COURSE

The objectives of the discipline are to assimilate by students the basics of design and operation of pumping and compressor stations (pumps, fans and compressors) used in the technological chains of oil refining enterprises.

SHORT DESCRIPTION OF THE COURSE

Discipline to teach future specialists the technology and organization of the construction of the linear part of the main pipelines and the development of technological schemes for the installation ofstructures of buildings of compressor stations, NS, as well as the main and auxiliary technological equipment, engineering networks and technological pipelines, ensuring their safe operation and reliability for the standard service life and during construction and reconstruction.

KNOWLEDGE, ABILITY, SKILLS AFTER COMPLETION OF THE COURSE

Matrix course outcomes - student outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the course, students should be able to	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Know the economic, environmental, social and industrial safety issues of the oil and gas industry;		✓									✓
Understand the terms of the production process, production managementsystems; proposals for improving the efficiency of using resources (material, technical and labor)	✓						✓				
Develop a feasibility study for innovative solutions in professional activities			✓	✓							✓

To independently acquire and use new knowledge and skills in practice, including in new areas of knowledge that are not directly related to the field of activity; develop operational plans for all types of activities related to research, development, design, construction, implementation and management of technological processes and production in the field of construction, transportation and storage of hydrocarbons	✓				✓						✓
Possess program-targeted methods for solving scientific problems.	✓	✓				✓					✓

PET445 - Design of main pipelines
CREDITS – 5(1/0/2/2)
PREREQUISITE – no

AIMS AND OBJECTIVES OF THE COURSE

The purpose of studying the discipline is for students to acquire the skills of technological calculation of the main pipeline in order to select the main equipment, as well as mechanical calculation for reliable and safe operation of the main pipeline.

SHORT DESCRIPTION OF THE COURSE

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.

KNOWLEDGE, ABILITY, SKILLS AFTER COMPLETION OF THE COURSE

Matrix course outcomes - student outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the course, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Determine the initial data for the design of the main pipeline, select the steel grade of the main pipeline pipe according to regulatory and technical documents					✓			✓			
To carry out the technological calculation of the main pipeline with conclusions and recommendations.	✓				✓						

Choose the brand of pumps and compressors				✓		✓					✓
Use economic parameters to justify efficiency and technological solutions			✓								✓
Choose rational modes of operation of the main pipeline				✓	✓						
Definition of main pipeline pumping systems	✓		✓								
Apply the regulatory, technical and legal framework in the field of design, construction and operation of the main pipeline and forecasting their technical condition.			✓						✓	✓	

PET178 – Computational fluid dynamics for petroleum engineering
CREDITS – 5 (1/1/1/2)
PREREQUISITE – no

AIMS AND OBJECTIVES OF THE COURSE

To acquaint students with the peculiarities of fluid movement through pipes, types and characteristics of movement, hydraulic shock and cavitation.

SHORT DESCRIPTION OF THE COURSE

The discipline describes the laws of fluid motion, fluid dynamics, modes of fluid motion, fluid motion in pipelines

KNOWLEDGE, ABILITY, SKILLS AFTER COMPLETION OF THE COURSE

Matrix course outcomes - student outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the course, students should be able to	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Understand methods for determining fluid motion		✓					✓				✓
Apply flow continuity equations, classify hydraulic losses	✓					✓					✓
Perform hydraulic calculation of the oil pipeline		✓		✓				✓			
Determine pressure loss, cavitation and hydraulic shock			✓	✓							
Apply techniques to determine the hydraulic characteristics of an oil pipeline	✓	✓						✓			
To improve the existing methods of accounting for the oil flow regime in the main pipeline and calculating their relationship with the hydrodynamic action.		✓	✓			✓		✓		✓	

PET446 - Operation of main pipelines
CREDITS – 5 (1/0/2/2)
PREREQUISITE – no

AIMS AND OBJECTIVES OF THE COURSE

The main purpose of studying the discipline is for students to acquire basic skills in the operation of a trunk pipeline by types of pumping product (oil and gas).

SHORT DESCRIPTION OF THE COURSE

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.

KNOWLEDGE, ABILITY, SKILLS AFTER COMPLETION OF THE COURSE

Matrix course outcomes - student outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the course, students should be able to	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Know the operation procedure of the main oil pipeline and the main gas pipeline	✓		✓			✓			✓	✓	✓
Know the organization of the operation of the main pipeline: the linear part and pumping stations	✓		✓			✓		✓	✓	✓	✓
Develop a plan for maintenance and repair of the main pipeline: the linear part and pumping stations	✓			✓		✓	✓		✓	✓	✓
Understand the operational dispatch management of the main pipeline and the material balance	✓			✓	✓			✓			✓
Regulate the operation of pumping stations taking into account connecting pipelines and branches	✓			✓							✓
Ensure continuous and reliable transportation of oil and natural gas	✓	✓		✓					✓		
Assess the condition of the internal cavity of the main pipeline	✓			✓						✓	
Apply knowledge, modern methods and software tools in the operation of the main pipeline	✓			✓							✓
Understand the pumping system	✓			✓	✓						
To make technical decisions in special cases of oil and gas pumping	✓										
Make planned preventive maintenance of the main pipeline	✓		✓		✓						

PET434 - Design and operation of gas and oil storage facilities
CREDITS – 3 (1/0/2)
PREREQUISITE – no

AIMS AND OBJECTIVES OF THE COURSE

The purpose of studying the discipline is to acquire students' skills in calculating oil depots and equipment, reliability and efficiency of operation of all gas and oil storage facilities, development and implementation of measures to reduce oil losses.

SHORT DESCRIPTION OF THE COURSE

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 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.

KNOWLEDGE, ABILITY, SKILLS AFTER COMPLETION OF THE COURSE

Matrix course outcomes - student outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the course, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Explain the conditions and operating modes of gas and oil storage facilities used for the construction of oil and gas production and processing industry steel grades and other building materials, as well as the basic methods of calculation and design in accordance with the existing regulatory documentation					✓			✓			
To calculate the capacity of the tank farm tank farm, losses when filling transport tanks, to choose and apply various pipeline materials depending on the operating loads and operating conditions of equipment and structures	✓				✓						
Recommend the methodology of hydraulic calculations of hydrodynamic systems				✓		✓					✓
Use economic parameters to justify the effectiveness of proposed projects and technological solutions			✓								✓
Choose rational modes of operation of gas and oil storages				✓	✓						
Basic calculations and materials required in the design of gas and oil storage facilities	✓		✓								
To evaluate the regulatory, technical and legislative base of design systems and organizations for the			✓						✓	✓	

construction of gas and oil pipelines and gas and oil storage facilities and the tasks of forecasting their technical condition.											

PET403 - Fundamentals of budgeting
CREDITS – 5 (1/1/1/2)
PREREQUISITE – no

AIMS AND OBJECTIVES OF THE COURSE
The main goals and objectives of the discipline are to determine the estimated cost of the construction of the main pipeline

SHORT DESCRIPTION OF THE COURSE
This course covers the main aspects of the estimated cost of the construction of the main pipeline. It presents topics such as calculating the volume of work, the composition of the contract price, maintenance and repair of the main pipeline, calculation of the tariff for transportation and storage of oil and gas.

KNOWLEDGE, ABILITY, SKILLS AFTER COMPLETION OF THE COURSE

Matrix course outcomes - student outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the course, students should be able to	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Calculate the amount of work and generate a statement of the calculation of the amount of work		✓									✓
Know the pre-design and design estimate documentation and form contractual prices	✓					✓	✓				
Calculate operating costs		✓		✓		✓					✓
Determine the estimated cost of construction materials		✓						✓			
Make a local estimate		✓									
Understand the regulatory complexity of the work					✓						✓
Calculate and form a tariff for the transportation and storage of oil and/or gas			✓							✓	

PET419 - Corrosion protection of oil and gas equipment
CREDITS – 5 (2/0/1/2)
PRE-REQUISIT - no

AIMS AND OBJECTIVES OF THE COURSE
Demonstrate the theoretical and practical training necessary for an independent assessment of the corrosive activity of the environment, the choice of construction materials and means of corrosion protection for equipment in the oil and gas complex; evaluate methods for determining the calculated

corrosion processes; to adapt in practical terms the knowledge gained in solving technological problems using the knowledge of fundamental laws.

SHORT DESCRIPTION OF THE COURSE

Basic concepts and definitions of corrosion processes. Chemical corrosion of metals. Electrochemical corrosion of metals. Corrosion surveys. Insulation coatings for metal structures. Cathodic protection of underground metal structures. Protection of pipelines and tanks. Electric drainage protection of underground pipelines. Corrosion inhibitors.

KNOWLEDGE, ABILITY, SKILLS AFTER COMPLETION OF THE COURSE

Matrix course outcomes - student outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the course, students should be able to	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Understand the purpose and composition of the objects of the transport system, linear part, pumping and compressor stations, pumping modes, requirements for fulfilling pumping technological conditions.	✓	✓									✓
Know modern achievements in the field of automation and intellectualization of pumping technological processes, measurement principles	✓	✓									✓
Evaluate the safe values of the physical characteristics and operating modes of technological objects.		✓		✓					✓		
Work in monitoring and control systems at computerized workplaces in a team, in interaction with specialists of related professions using various information channels						✓					
Reduce the consequences of emerging deviations and manage risks.	✓				✓						✓
Produce and interpret estimation errors for calculating reservoir properties.	✓		✓								✓
Possess modern software, skills in managing technological processes using automated			✓					✓			✓
workstations, methods for assessing the consequences of engineering and organizational decisions											

PET430-Computed aided design systems
CREDIT – 5 (2/0/1/2)
PRE-REQUISITE – no

PURPOSE AND OBJECTIVES OF THE COURSE

The acquisition of theoretical and practical knowledge by students on the basics of modern computer-aided design systems, getting an idea of CAD / CAE / CAM systems that are widely used in the world for the design of objects.

SHORT DESCRIPTION OF THE COURSE

This course covers solving problems associated with the development of innovative and efficient methods of hydrocarbon production, transportation and storage, as well as issues of modeling technological processes. The aim of the course is to develop the skills of using software products in undergraduate students, as well as to develop their scientific and experimental research skills. The course contains topics about theorems and similarity criteria, the method of dimensions, the basics of mathematical and computer modeling.

KNOWLEDGE, ABILITY, SKILLS TO BE OBTAINED WITHIN THE COURSE

Matrix of course outcomes vs student results

Course outcomes	**Criterion 3. Students results**										
Upon completion of the course students must be able to…	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Explain the methodology of scientific research using modern program-targeted complexes of physical and mathematical modeling	✓										
Show the main technological processes in the industry, algorithms and programming languages					✓					✓	
Use physical, mathematical and computer models of the investigated processes, phenomena and objects related to the professional sphere	✓									✓	✓
Create new methods of modeling and calculations required in the design of technological processes and technical devices in the oil and gas industry and improve them				✓						✓	✓
Develop models of design solutions for quality management in oil and gas production				✓				✓			
Conduct a multi-criteria assessment when optimizing technological processes, projects, the work of an oil and gas organization		✓		✓	✓						
Compare modern computer technology, master the skills of developing physical and						✓				✓	✓

PET404 - Management in the design and construction of oil and gas facilities
CREDITS – 5 (1/1/1/2)
PREREQUISITE – no

AIMS AND OBJECTIVES OF THE COURSE
The purpose of this course is to develop students' practical business management skills in the construction of oil and gas facilities: strategy formation, optimization of financial flows, etc.; modern knowledge in the field of investment and construction activities.

SHORT DESCRIPTION OF THE COURSE
The course is aimed at the formation of tracking professional competencies: creation of a process model, construction of an object, selection of contractors, management of contractors' work (design, construction and installation work, production), control and forecast of the processes involved in terms of deadlines, monetary and labor costs and the ratio of the developed business model.

KNOWLEDGE, ABILITY, SKILLS AFTER COMPLETION OF THE COURSE

Matrix course outcomes - student outcomes

Course Outcomes	Criterion 3. Students' results										
Upon completion of the discipline, studentsshould be able to	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Know the features of the arrangement of oil and gas fields and their difference from industrial construction			✓		✓						
Evaluate significant volumes of construction and its duration			✓			✓					
To know the peculiarities of the dispersion of the objects of arrangement on a large territory of the regions of the country.	✓										
Be able to link oil production facilities to deposits of raw materials and to settlements				✓		✓					
Be able to assess energy costs, the complexity of logistics of pumping oil and gas, the link to natural reserves of water supply.				✓				✓		✓	

PET111 - Economic evaluation of oil and gas projects
CREDIT - 5 (1/0/2/2)
PREREQUISITE - no

AIM AND OBJECTIVES OF THE COURSE
The purpose of this course is to develop students' practical skills in calculating the economic efficiency of oil and gas projects.

BRIEF DESCRIPTION OF THE COURSE
Enterprise as a business object. Market communication of enterprises. Enterprise economic resources

and resource management. Production costs and cost of production. Financial results and operational efficiency of the enterprise. Investment and innovation policy of the enterprise. Organization of production, the basics of organizing production processes, organization of continuous production. Human resources and personnel policy of the enterprise in labor resources. Remuneration for labor. Organization of material, technical and instrumental services of production processes.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Classify oil reserves and estimate proven reserves using the volumetric method, production decline curve and material balance (p / z); also, predict production over time.											✓
Indicate in the form of a summary report the main forms of ownership of oil resources, laws, fiscal systems and financial interests associated with their exploitation in Kazakhstan and at the international level.								✓			
Conduct a standard analysis of cash flow for oil projects and determine the acceptability of the proposed projects, and highlight the most attractive in the list of eligible projects.											✓
Estimate uncertainties in reserve estimates and economic valuation											✓
Combine social, political, cultural and environmental factors in the decision-making process.								✓	✓	✓	

ECA003, ECA103 - Writing and Defense of the Thesis (Project)
CREDIT - 6
PREREQUISIT – no

AIM AND OBJECTIVES OF THE COURSE

Development of students' skills to work both in a team and individually; analysis and interpretation of the data obtained; development of new solutions; justification of the decisions made, as well as the results obtained.

BRIEF DESCRIPTION OF THE COURSE

It is a mandatory component of the final certification of students.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Collect information, make calculations and / or analyze data to achieve specific goals of the thesis and solve engineering problems in the oil and gas industry		✓	✓		✓				✓		✓
Summarize the results of research paper in the text, tabular and graphic forms corresponding to GOST standards		✓					✓				✓
Привести соответствующие выводы из дипломной работы в соответствии с целями проекта, подтвержденные данными, расчетами и / или анализом		✓	✓		✓		✓		✓		
Determine the limitations of the work performed and make recommendations for further research, if necessary, supported by evidence presented in the results and discussions of the study		✓	✓		✓		✓		✓		
Determine the significance, potential benefits and possible applications of the results and conclusions of the thesis			✓		✓		✓	✓	✓		
Title the project and write an abstract of the article / presentation of the thesis at the conference							✓				
Prepare slides of thesis in Microsoft PowerPoint that can be used in an oral presentation to demonstrate that research results, conclusions and recommendations are correct and useful							✓				✓
Present the results of the thesis orally to a group of petroleum engineers and trainers in							✓				

15-20 minutes using PowerPoint slides											

ECA103 - Defense of the Thesis (Project)
CREDIT - 6
PREREQUISIT – no

AIM AND OBJECTIVES OF THE COURSE
Development of students' skills to work both in a team and individually; analysis and interpretation of the data obtained; development of new solutions; justification of the decisions made, as well as the results obtained.

BRIEF DESCRIPTION OF THE COURSE
It is a mandatory component of the final certification of students.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Collect information, make calculations and / or analyze data to achieve specific goals of the thesis and solve engineering problems in the oil and gas industry		✓	✓		✓				✓		✓
Summarize the results of research paper in the text, tabular and graphic forms corresponding to GOST standards		✓					✓				✓
Привести соответствующие выводы из дипломной работы в соответствии с целями проекта, подтвержденные данными, расчетами и / или анализом		✓	✓		✓		✓		✓		
Determine the limitations of the work performed and make recommendations for further research, if necessary, supported by evidence presented in the results and discussions of the study		✓	✓		✓		✓		✓		
Determine the significance, potential benefits and possible applications of the results and conclusions of the thesis			✓		✓		✓	✓	✓		
Title the project and write an abstract of the article / presentation of the thesis at the conference							✓				

Prepare slides of thesis in Microsoft PowerPoint that can be used in an oral presentation to demonstrate that research results, conclusions and recommendations are correct and useful							✓				✓
Present the results of the thesis orally to a group of petroleum engineers and trainers in							✓				

15-20 minutes using PowerPoint slides											

PET441 - Multidisciplinary Oil and Gas Project
CREDIT - 5 (2/1/0/2)
PREREQUISITE - PET130 Oil and Gas Engineering Seminar

AIM AND OBJECTIVES OF THE COURSE
The aim of this course is to develop students' skills for effective teamwork and communication with colleagues, with the leader, and with industry representatives.

BRIEF DESCRIPTION OF THE COURSE
This course provides a multidisciplinary environment for students to integrate knowledge of geology, geophysics, and petroleum engineering to solve real-life problems in the oil and gas industry. Students work in teams and, at the end of the course, present the results of their work orally and in writing.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Work effectively, focusing on the evaluation of their peers and instructors				✓							
Explain what data and specific methods are needed to solve the main problems in the project.			✓		✓						✓
Describe the various technical, economic, social, political or other constraints that need to be considered during the various steps of the decision-making process.		✓		✓				✓		✓	✓
Apply design principle to solving a technical problem		✓	✓								
Predict and optimize performance using appropriate tools.			✓	✓	✓						✓
Examine uncertainty in data, discuss possible implications for results, and consider ways to minimize risks.			✓					✓			
Effectively present engineering research results in a written report.							✓				

CATALOGUE OF ELECTIVE COURSES

PET443 - Fundamentals of rationing and tariff formation
CREDIT - 5 (1/0/2/2)
PREREQUISIT - no

AIM AND OBJECTIVES OF THE COURSE

The purpose of this course is to develop students' practical skills:
- calculation of normative technical losses, technical and technological norms of consumption of raw materials, materials, fuel and energy;
- calculation of tariffs for transportation and storage of oil and/or natural gas.

BRIEF DESCRIPTION OF THE COURSE

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.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Determine regulatory technical losses and technological standards during the operation of the main pipeline					✓	✓		✓	✓	✓	✓
Calculate the amount of oil and/or natural gas for your own needs and technological losses, give an analysis with recommendations					✓	✓		✓	✓	✓	✓
Calculate the consumption rates of raw materials, materials, fuel and energy during the operation of the linear part and pumping stations of the main pipeline, give an analysis with recommendations					✓	✓		✓	✓	✓	✓
To form (calculate) a tariff for the transportation and storage of oil and/or gas for the domestic market. To give an assessment taking into account social factors of the Republic of Kazakhstan						✓		✓	✓	✓	✓
To form (calculate) a tariff for the transportation and storage of oil and/or gas for the foreign market, taking into account the peculiarities of political and economic relations of the border countries with the Republic of Kazakhstan						✓	✓	✓	✓	✓	✓

GEN408 - Solving problems of oil and gas engineering
CREDIT - 5(1/0/2/2)
PREREQUISIT - no

AIM AND OBJECTIVES OF THE COURSE

The purpose of the discipline is to consider case problems with the industry and their solution, which includes the topics of engineering and technology in drilling, mining, development and transportation; safety, labor protection, management.

BRIEF DESCRIPTION OF THE COURSE

Analyze and summarize experimental data on production problems, improve methods of operation and maintenance of equipment, apply innovative methods to solve production problems, design and develop new innovative technological processes and equipment for oil and gas production and transportation of oil and gas, manage the complex technological process of development, operation and transportation of oil and gas.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline,students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Know the main causes of production tasks			✓								
Know the principles of improving the methods of operation and maintenance of equipment		✓									
Be able to manage the complex technological process of development, operation and transportation of oil and gas					✓						
Be able to apply innovative methods to solve production problems								✓			
Evaluate and analyze the results obtained by experimental data		✓									

CHE452 - Environmental management and environmental safety
CREDIT - 5 (1/0/2/2)
PREREQUISIT - no

AIM AND OBJECTIVES OF THE COURSE

Environmental management and environmental safety during the operation of the main pipeline.

BRIEF DESCRIPTION OF THE COURSE

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.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	Criterion 3. Students' results										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Know the principles of: prevention, correction, precaution, proportionality, "polluter pays", sustainable development, integration, accessibility of environmental information, public participation, ecosystem approach	✓		✓			✓		✓	✓	✓	✓
Form standards: emissions, quality, physical impact on the natural environment, permissible anthropogenic impact on the environment	✓	✓				✓		✓	✓	✓	✓
Make an environmental impact assessment (EIA)	✓				✓	✓		✓	✓	✓	✓
Develop an environmental impact declaration	✓					✓		✓	✓	✓	✓
Apply the best available technologies for sustainable development.	✓				✓	✓		✓	✓	✓	✓

PET418 - Oil and Gas Engineering Seminar
CREDIT - 5 (2/1/0/2)
PREREQUISIT - no

AIM AND OBJECTIVES OF THE COURSE
Develop students' general skills needed in the research finding, writing research papers, as well as public speaking.

BRIEF DESCRIPTION OF THE COURSE
Introduction to Scientific Research; the structure of the thesis project, ethical issues; choice of research direction; study of the state of the art of research; analysis of scientific literature; patent search; research methodology; planning an experiment; determination of measurement error; structure and preparation of a scientific article; preparation of presentation for defense; structure and preparation of the "Proposal for scientific research"; public speaking skills; information content of the speech.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	Criterion 3. Students' results										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**

Prepare an introduction for the article / presentation, consisting of the relevance of the study, a literature review of previous work, the need for further study and research objectives					✓		✓		✓		✓
Prepare a section "Methodology" for the article / presentation, including objectives, data and methods used, as well as assumptions made in the study			✓		✓		✓		✓		✓
Summarize results in appropriate text, tabular, and graphical forms that comply with Society of Petroleum Engineers (SPE) Presentation Standards		✓					✓				✓
Prepare a "Discussion" section for the report / presentation, including analysis and interpretation of research results		✓			✓		✓		✓		✓
Prepare a Bibliography section in accordance with the SPE style guide, including listing all literature referenced in the technical part of the report					✓	✓	✓		✓		

GEO487 - Technical policy
CREDIT - 5 (2/0/1/2)
PREREQUISIT – no

AIM AND OBJECTIVES OF THE COURSE

The main purpose of studying the discipline is for students to acquire basic skills in the field of technical policy in the operation of the main pipeline.

BRIEF DESCRIPTION OF THE COURSE

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.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Solve a complex of scientific and technical issues to improve the technical level of operation and management of the main pipeline,			✓					✓	✓	✓	✓
Be able to solve strategic issues and tactics of development of trunk pipeline systems			✓		✓			✓	✓	✓	✓

Possess and understand the principles of technical regulation and apply them for reliable and safe operation of the main pipeline					✓			✓	✓	✓	✓
Possess information about the trends of innovative development in the field of oil and/or natural gas trunk pipeline transport and apply them in the production process			✓		✓			✓	✓	✓	✓
Possess the skills of independent study and analysis of new theoretical developments in the field of the main pipeline	✓							✓	✓	✓	✓
Apply methods of economic evaluation of efficiency	✓							✓	✓	✓	✓
Apply methods of monitoring the effectiveness of the development of new trunk pipelines								✓	✓	✓	✓

PET451 - Fundamentals of Data Analytics and Programming for Oil Engineers
CREDIT - 5 (1/1/1/2)
PREREQUISIT – no

AIM AND OBJECTIVES OF THE COURSE

The main purpose of studying the discipline is the acquisition by students of basic skills in assessing reliability and predicting complications during the operation of equipment in the oil and gas industry, selecting methods to increase oil recovery, optimizing transport routes, as well as predicting the effectiveness of the development of new fields.

BRIEF DESCRIPTION OF THE COURSE

The discipline covers topics such as probability theory, regression, correlation, creation of scripts and modules for calculating data during reservoir assessment, development and drilling.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline,students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Know the basics of probability theory, regression, correlation	✓										
Own programs for creating scripts and modules for computing	✓										
Be able to describe patterns in reservoir assessment, development and drilling		✓									

Apply mathematical methods in describing reliability assessment and predicting complications			✓								
Apply mathematical methods in predicting the efficiency of the development of new deposits			✓								

PET417 - Risk analysis
CREDIT - 5 (2/0/1/2)
PREREQUISIT – no

AIM AND OBJECTIVES OF THE COURSE

Formation of students' knowledge about the risks during the operation of the main pipeline, systematic use of available information to assess the frequency of occurrence of specific events and the extent of their consequences.

BRIEF DESCRIPTION OF THE COURSE

This course covers the possible consequences in each specific situation, an effective risk analysis allows you to detect problems and assess prospects. Some topics include:
- deterministic risk analysis "best, worst and most likely option";
- stochastic risk analysis.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
Assess qualitative or quantitative risk levels	✓		✓		✓			✓	✓	✓	✓
Use point estimates: worst, best, most likely scenarios	✓		✓	✓	✓			✓	✓	✓	✓
To justify the choice of an option To			✓					✓	✓	✓	✓
distribute probabilities according to a realistic way of describing the uncertainty of variables in the process of risk analysis			✓		✓			✓	✓	✓	✓
Apply international experience	✓		✓		✓			✓	✓	✓	✓

PET417 - Legal and regulatory framework in Subsoil Use
CREDIT - 5 (2/0/1/2)
PREREQUISIT – no

AIM AND OBJECTIVES OF THE COURSE

The main goals and objectives of the discipline: formation of knowledge about the basic principles, concepts, subsoil use, the structure and content of legal relations in the field of subsoil use, the legislative array governing relations related to the use of subsoil, applicable norms of international

treaties and agreements.

BRIEF DESCRIPTION OF THE COURSE

This course covers the main aspects of oil and gas business law. It covers topics such as the science and engineering basis of oil and gas legislation, energy policy, and oil and gas leases. This course focuses on the legal regulations governing the development of private mineral rights, which often also apply to public resources. It covers topics such as the nature, protection and transfer of oil and gas rights, leasing and taxation.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Course Outcome Matrix - Student Outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the discipline,students should be able to	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Understand the general provisions and concepts of the regulatory framework of Kazakhstan		✓									✓
Know the types of transactions and documentation	✓					✓	✓				
Know the subsoil use right		✓		✓		✓					✓
Know the process and sequence of preparing a draft subsoil use contract			✓					✓			
Know the conditions for offshore exploration and production		✓					✓				
Know the conduct of oil operations within the safety zone		✓						✓			
Draw up a working program and a project of prospecting works		✓									
Understand the specifics of granting subsoil userights during the transition from the exploration stage to the production stage					✓						✓
Know the process of liquidation and conservation of subsoil use objects			✓							✓	

PET450 - Engineering of oil and gas processing complexes
CREDITS – 3 (2/0/1)
PREQUISIT - no

AIMS AND OBJECTIVES OF THE COURSE

The purpose of this course is to develop students' skills in the use of analytical and numerical tools for the engineering of oil and gas processing complexes.

SHORT DESCRIPTION OF THE COURSE

This discipline covers the engineering processes of oil and gas processing complexes and solving problems when choosing methods.

KNOWLEDGE, ABILITY, SKILLS AFTER COMPLETION OF THE COURSE

Matrix course outcomes - student outcomes

Course Outcomes	Criterion 3. Students' results										
Upon completion of the course, students should be able to	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**	**(k)**
To determine the basic principles of designing oil and gas processing plants	✓							✓	✓	✓	✓
Understand and read technological schemes of oil and/or gas refining and oil and/or gas purification plants	✓				✓			✓	✓	✓	✓
Apply digital technologies at accounting nodes	✓				✓			✓	✓	✓	✓
Apply engineering methods of calculation, evaluation of the effectiveness of elements	✓	✓			✓			✓	✓	✓	✓
To evaluate the efficiency of production	✓		✓		✓			✓	✓	✓	✓
Possess the methodology of engineering calculations of technological indicators of oil and gas processing complexes	✓			✓	✓			✓	✓	✓	✓

PET429 - Multiphase flow systems
CREDITS – 5 (1/0/2/2)
PREQUISIT - PET124 Development of oil and gas fields I: Primary production

AIMS AND OBJECTIVES OF THE COURSE

To acquaint students with the current state of the theory of multiphase flows. Get a general idea of themethods for calculating the characteristics of two-phase flows; Master the methodology of physical modeling of multiphase flows; Get information about the processes of transfer of multiphase flows.

SHORT DESCRIPTION OF THE COURSE

The discipline explains the formation of multiphase flows in horizontal, deviated and vertical wells and pipelines, methods of dynamic calculations, determination of technological parameters. General conservation laws, interphase conditions and constitutive relations. Multiphase flows in pipes, maps of flow regimes, concentration distributions, pressure drop.

KNOWLEDGE, ABILITY, SKILLS AFTER COMPLETION OF THE COURSE

Matrix course outcomes - student

outcomes

Course Outcomes	**Criterion 3. Students' results**										
Upon completion of the course, students should be able to	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Understand the basic concepts of multiphase flow systems		✓					✓				✓
Apply empirical correlations to determine the technological parameters of the system during the transportation of gas-liquid flows	✓					✓					✓
Perform hydraulic calculations of multiphase flows in oil and gas transmission systems		✓		✓				✓			
Build a hydrodynamic model of multiphase flows to optimize field productivity			✓	✓							
Apply methods for performing dynamic calculations, programming the calculation modules of multiphase flow meters,constructing nomograms that allow taking into account the flow regime in analytical calculations.	✓	✓						✓			
Build a hydrodynamic model for well killing planning	✓	✓									✓
Predict and optimize well performance using reservoir simulation and uncertainty estimates.					✓						✓
To improve the existing methods of accounting for the flow regime for calculating interfacial friction, by introducing criteria that determine		✓	✓			✓		✓		✓	
the flow regime of a multiphase system in a continuous setting, and calculating their relationship with the hydrodynamic action.											

APPENDIX 1 – SPE COMPETENCE MATRIX

Competency Matrix for General Petroleum Engineering SPE Task Force on Minimal Competency			
TASK	**GENERAL KNOWLEDGE/SKILL**		
	MINIMUM COMPETENCE BREADTH	**MINIMUM COMPETENCE DEPTH**	**ABOVE MINIMUM COMPETENCE**
Understand and use petroleum engineering terminology.	Understand general terminology of all sub- disciplines.	Understand terminology specific to the sub-discipline.	Understand terminology in areas of expertise.
Identify and use relevant 22i9n3d4u2s/tSrPyEa-nd company design standards.	Identify what design standards exist in all sub- disciplines.	Understand and use conventional design standards specific to the subdiscipline.	Help create design standards as well as apply standards to nonconventional applications.
Maintain regulatory compliance.	Identify what regulatory bodies have jurisdiction and where to find documentation of the applicable regulations. Understand the essential rules relevant to the work project.	Complete necessary regulatory compliance permitting and reporting specific to the sub- discipline.	Work with regulators on rule changes and exceptions.
Identify and use technical software and informational databases.	Identify what technical software and informational databases exist in all sub- disciplines.	Understand and use conventional technical software and informational databases specific to the subdiscipline.	Help create technical software and informational databases as well as apply technical software and informational databases to nonconventional applications.
Use project management skills.	Understand the elements of project management (costing, scheduling,	Apply project management skills to projects within sub-discipline.	Apply project management skills in larger projects and across

	contracting, logistics, etc.).		subdisciplines.
Understand and apply geoscience principles.	Understand geoscience principles (e.g., fracture gradients, well bore stability, pore pressure prediction).	Understand and apply geoscience principles within sub-discipline.	Apply geoscience principles across sub-disciplines.
Perform decision and risk analysis and contingency planning.	Understand decision and risk analysis concepts and the value of contingency planning.	Conduct risk assessments within subdiscipline and prepare contingency plans to manage risks.	Conduct risk assessments across subdisciplines for a project and prepare contingency plans.
Monitor operations and optimize performance.	Understand basic monitoring and optimization techniques. Carry out directed well optimization plans or programs.	Perform conventional operations monitoring and engineering design specific to a sub-discipline and make optimization recommendations.	Perform operations monitoring in areas of expertise or across subdisciplines and make recommendations to optimize system performance.
Evaluate economics of project.	Understand basic economic principles (PV analysis, lease vs. purchase, etc.).	Perform economic evaluations of projects within the sub-discipline.	Perform economic evaluations across sub- disciplines or in specialty areas within a sub-discipline.
Participate in a multidisciplinary/cultural team.	Understand the purposes and value of a multi- disciplinary/ cultural approach to a project.	Perform all the conventional duties of the sub-discipline team member.	Lead a multi-disciplinary/ cultural team and be able to perform the duties of two or more sub-disciplines.
Perform duties in ethical manner.	Demonstrate the ethical code of behavior for the general practice of engineering.	Demonstrate ethical behavior in subdiscipline.	Demonstrate ethical behavior and provide leadership in ethical behavior across disciplines.
Promote engineering professionalism.	Maintain membership in technical and professional societies and pursue	Participate actively in technical and professional societies and obtain	Encourage othersin industry to join and actively participate in technical and

	professional license and/or certification.	professional license and/or certification.	professional societies and to become licensed or certified.

ЖАУАПКЕРШІЛІГІ
ШЕКТЕУЛІ
СЕРІКТЕСТІГІ

ЭКО АСТАНА НР

ТОВАРИЩЕСТВО
С ОГРАНИЧЕННОЙ
ОТВЕТСТВЕННОСТЬЮ

Қазақстан Республикасы,
010000, Нұр-Сұлтан қаласы, Сол жағалау,
Сығанақ көшесі 14/1, 10 кеңсе,
e-mail: manager@ecoastana.kz
eco-astana-nr@mail.ru

тел./факс.:+7 (7172)
26-61-17, 26-61-18
вебсайт: ecoastana.kz

Республика Казахстан
010000, г. Нур-Султан, Левый берег
ул. Сыганак 14/1, офис 10,
e-mail: manager@ecoastana.kz
eco-astana-nr@mail.ru

РЕЦЕНЗИЯ

на образовательную программу 6В07209 «Магистральные сети и инфраструктура» для программы «Бакалавриат», разработанная преподавателями кафедры «Нефтяная инженерия» Института Геологии и нефтегазового дела Казахского Национального Исследовательского Университета имени К. Сатпаева

Рецензируемая образовательная программа 6В07209 «Магистральные сети и инфраструктура» для программы «Бакалавриат» (ОП) представляет собой систему документов, комплекс основных характеристик образования, форм аттестации и определяет цели, ожидаемые результаты, содержание, условия и реализацию образовательного процесса, оценку качества подготовки выпускника по данному направлению подготовки. Включает в себя: учебный план, программы дисциплин (модули), фонды оценочных средств для проведения текущей, промежуточной и итоговой аттестации обучающихся и другие материалы, обеспечивающие качество подготовки обучающихся, а также программы практик и методические материалы, обеспечивающие реализацию соответствующей образовательной технологии. В ОП указаны: миссия, цели и задачи ОП; срок освоения ОП; квалификация, присваиваемая выпускникам; виды профессиональной деятельности, к которым готовятся выпускники; планируемые результаты освоения ОП, и др.

Структура ОП включает следующие разделы:

- Дисциплины (модули), который включает дисциплины (модули) относящиеся к базовой части программы и дисциплины (модули), относящиеся к ее вариативной части;
- Практики, которые в полном объеме относятся к вариативной части программы;
- Дипломная работа (проект), который в полном объеме относится к базовой части программы и завершается присвоением квалификации «Бакалавр».

Содержание ОП не противоречит ГОСО.

Дисциплины по выбору студента составляют третью часть вариативной части.

Дисциплины по рецензируемой ОП формируют весь необходимый перечень общекультурных, общепрофессиональных и профессиональных компетенций, предусмотренных ГОСО. В числе конкурентных преимуществ программы следует отметить, что к ее реализации привлекается достаточно опытный профессорско-преподавательский состав, а также работники производства. Качество содержательной составляющей учебного плана не вызывает сомнений. Включенные в ОП дисциплины раскрывают сущность актуальных на сегодняшний день экономических проблем в области магистрального транспорта нефти и /или природного газа. Структура плана в целом логична и последовательна. Оценка рабочих программ учебных дисциплин позволяет сделать вывод о высоком их качестве и достаточном уровне методического обеспечения. Содержание дисциплин соответствует компетентностной модели выпускника.

Разработанная ОП предусматривает профессионально-практическую подготовку обучающихся в виде учебной и производственной практик. Разработанная ОП в полной мере соответствует заявленному уровню подготовки бакалавра. Предусмотренные дисциплины формируют высокий уровень компетенций, предусмотренных ГОСО.

Таким образом, рецензируемая образовательная программа соответствует требованиям представителей профессионального сообщества и может быть использована для осуществления образовательной деятельности по направлению подготовки 6В07209 «Магистральные сети и инфраструктура».

Директор **Р. Шаихов**

Рецензент **Ш. Саитов**

МИНОБРНАУКИ РОССИИ
федеральное государственное бюджетное образовательное учреждение
высшего образования
«Самарский государственный технический университет»
(ФГБОУ ВО «СамГТУ»)

РЕЦЕНЗИЯ

на образовательную программу бакалавриата специальности 6В07209 «Магистральные сети и инфраструктура», разработанную кафедрой «Нефтяная инженерия» института Геологии и нефтегазового дела Казахского национального исследовательского технического университета имени К. Сатпаева

Образовательная программа (далее ОП) по специальности 6В07209 «Магистральные сети и инфраструктура» представляет собой систему документов, разработанную на основе государственного образовательного стандарта РК. Рецензируемая ОП определяет программные образовательные цели, результаты обучения обучающихся, необходимые условия, содержание и технологии для реализации образовательного процесса, оценку и анализ качества обучающихся вовремя обучения и после окончания.

Цели, сформулированные в образовательной программе, ориентированы на формирование у студентов профессиональных компетенций, а также социально-экологической ответственности, тесно связанной с этическими нормами. Образовательная программа формирует компетенции, которые являются необходимыми для специалистов инженерного профиля, такие как: применение расчетных схем и инженерных методик при конструировании и проектировании; профессиональное чтение технологической документации и характеристик оборудования, процессов, продуктов; контроля характеристик оборудования, процессов и продуктов и т.д. Вместе с тем, студенты получают базовые знания в правовых отношениях в области проектирования и эксплуатации магистральных трубопроводов и нефтегазохранилищ, безопасности их функционирования.

В ОП приведены описание курсов, а также результатов обучения, которые ориентированы не только на знание и понимание дисциплины, но и на применение изученного материала на практике.

Завершающим этапом обучения по программе является выполнение дипломного проекта, который включает в себя сбор информации, соответствующие расчеты, анализ, выводы с рекомендациями.

В целом образовательная программа "Магистральные сети и инфраструктура" по своему содержанию соответствует заявленному уровню подготовки студента бакалавра.

Директор института нефтегазовых технологий СамГТУ _____ О.А. Нечаева