

THE MINISTRY OF EDUCATION AND SCIENCE
OF THE REPUBLIC KAZAKHSTAN

M. Auezov SOUTH KAZAKHSTAN UNIVERSITY



d.h.s., academician D.P.Kozhantzharova
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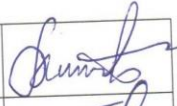
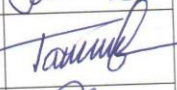

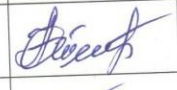






EDUCATION PROGRAMME

6B07172- " Technology Oil and Gas Processing »

Registration number	6B071000317
Education area code and classification	6B07 Engineering, manufacturing and construction industries
Code and classification of training areas	6B071 Engineering and engineering
Group of educational programs	B060 Chemical engineering and processes
Type of EP	updated
ISCED level	6
NQF level	6
ORC level	6
Language of instruction	English
Typical training period	4 years
Teaching method	intramura
The complexity of the EP, not less	240 credits
Distinctive features of EP	-
University partner (JEP)	-
University partner (TDEP)	-
Social partner (DE)	-

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Developers:

Daurenbek N.M.	Chairman Department of oil refining and petrochemistry Ph.D., associate professor	
Tanashev S.T.	Ph.D., associate professor Department of oil refining and petrochemistry	
Mamytova G.Zh	Art. Lecturer, Department of oil refining and petrochemistry	
Sarsenbaeva A.U.	Master, Art. Lecturer, Department of oil refining and petrochemistry	
Artykova Zh.K.	Master, Art. Lecturer, Department of oil refining and petrochemistry	
Mamedova A.	Group HT-18-6tk2	
Tkachev K.	Group HT-18-6tr1	
Eregenov B.T.	Production Director, PetroKazakhstanOil Products LLP	
Ospanov I.N.	Deputy director LLP "Neftehimstroi-Yug"	
Kubelekova U.D.	Director of quality LLP "Hill Corporation"	

The General education program was reviewed by the Committee on innovative learning technologies and methodological support of Higher schools of Chemical Engineering and biotechnology protocol № 7 from « 22 » 02 2021y.

chairman of committee _____

signature

Reviewed and recommended for approval at a meeting of the Educational and methodological Council of M. Auezov SKU protocol № 5 from « 23 » 02 2021 y.

Approved by the decision of the Academic Council of the University Protocol № 12 from « 25 » 02 2021 y.

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Introduction

1. Application

It is intended for training bachelors in the educational program 6B07172- " Technology Oil and Gas Processing» in the RSE at the BEC "M. Auezov South Kazakhstan State University" MES RK.

2. Normative document

The law of the Republic of Kazakhstan "On education" (with amendments and additions as of 04.07.2018);

Standard rules of activity of educational organizations implementing educational programs of higher and (or) postgraduate education, approved by the order of the Minister of education and science of the Republic of Kazakhstan dated October 30, 2018 No. 595 (registered in the Ministry of justice of the Republic of Kazakhstan on October 31, 2018 No. 17657);

State mandatory standards of higher and postgraduate education, approved by the order of the Minister of education and science of the Republic of Kazakhstan dated October 31, 2018 No. 604;

Rules for the organization of the educational process on credit training technology, approved by the order of the Minister of education and science of the Republic of Kazakhstan dated April 20, 2011 No. 152 with amendments and additions dated October 12, 2018 No. 563;

The industry qualification framework "Oil and Gas, oil refining and petrochemical industries" was approved by the Protocol of the Industry Commission on social partnership and regulation of social and labor relations of the oil and gas industry No. 1-2017 dated March 30, 2017

The industry qualification framework "Chemical production" was approved by the minutes of the meeting of the industry commissions on social partnership and regulation of social and labor relations for the mining, chemical, construction and woodworking, light industry and mechanical engineering dated August 16, 2016 No. 1.

3. The concept of the educational program

The goal of the educational program is coordinated with the mission of the University and is aimed at training the intellectual elite of the country, who have advanced knowledge and entrepreneurial skills, are fluent in three languages, demonstrate the skills of conceptual, analytical and logical thinking, creative approach in professional activities, are able to work in a national and international team, learn the strategy of learning throughout life.

The educational program is harmonized with the 6th level Of the national qualifications framework of the Republic of Kazakhstan, with the Dublin descriptors, and the 1st cycle of the Qualification Framework of the European Higher Education Area. (A Framework for Qualification of the European Higher Education Area), also with level 6 of the European Qualification Framework for Lifelong Learning.

The educational program is focused on professional and social order through the formation of professional competencies related to the necessary types of research, practical and entrepreneurial activities, adjusted to meet the requirements of stakeholders.

The uniqueness of EP 6B07170 - "oil and gas processing Technology" is basic for the oil refining and petrochemical industry, focused on the labor market through the availability of elective courses commissioned by employers.

The educational program is aimed at achieving learning outcomes through the organization of the educational process using the principles of the Bologna process, student-centered learning, accessibility and inclusivity.

The results of the training program are achieved through the following training activities:

- classroom classes: lectures, seminars, practical and laboratory classes are conducted taking into account innovative learning technologies, the use of the latest achievements of science, technology and information systems. Laboratory classes are held in accredited laboratories of the University: the Test regional laboratory of engineering profile "Structural and biochemical

materials" and the Laboratory of physical and chemical methods of analysis "SAPA", on the basis of educational, scientific and production complexes of "Hillcorporation" LLP, etc..

- extracurricular activities: independent work of the student, including under the guidance of a teacher, individual consultations;

- conducting professional practices, completing term papers and theses (projects) on request of enterprises.

The University has taken measures to maintain academic integrity and academic freedom, and to protect students from any kind of intolerance and discrimination.

The quality of the EP is ensured by involving stakeholders in its development and evaluation, systematic monitoring and review of its content.

4. Requirements for applicants

Established in accordance with the Standard rules for admission to education in the organization of education, implementing educational programs of higher and postgraduate education order (MES RK No. 600 of 31.10.2018)

1 PASSPORT OF THE EDUCATIONAL PROGRAM

1.1. Purpose and objectives of the educational program

The goal of the EP: Training of personnel who are competitive in the labor market, who are able to carry out production and technological, design, research and organizational and managerial activities related to the development of advanced technologies, substances and materials, equipment in the field of oil and gas processing.

Objectives of the EP:

-providing the learner with knowledge, skills, and competencies that allow them to see, analyze, and find solutions to engineering problems in the field of oil and gas processing technology using modern technologies and the results of experimental research;

- to form a spiritual and social consciousness, socially responsible behavior in society, understanding the importance of professional ethical standards and following these standards;

-training of a highly qualified, competitive multilingual specialist who has language competence based on parallel mastery of Kazakh, Russian and English languages, who is mobile in the international educational space and in the labor market, and who is capable of intercultural communication;

- providing conditions for the formation of skills for business activities.

1.2 List of qualifications and positions

A graduate of this EP is awarded the degree of " bachelor of engineering and technology» Bachelors in OP 6B07107-"Technology of processing of oil and gas" may hold positions: chief (settings, shop, production); the yardmaster (commodity, tank, liquefied petroleum gas); chief of the overpass (liquid, reagent equipment); head of the gas flare system management; head laboratory; Manager; Deputy chief of workshop, engineer quality control engineer; chemical engineer without any requirements for work experience in accordance with the Industry qualification framework "oil and Gas, oil refining and petrochemical industries", " Chemical production»

1.3 Qualification characteristics of the graduate of the educational program

1.3.1 Sphere of professional activity

The sphere of professional activity is enterprises for the production of organic substances, oil and gas processing, research and design institutes, colleges.

1.3.2 Objects of professional activity

The objects of professional activity are equipment, technological processes and industrial systems for obtaining substances, materials, products, as well as their management and regulation systems; chemicals and materials; methods and devices for determining the composition and properties of substances and materials; methods and means for assessing the state of the environment and protecting it from the influence of industrial production, energy and transport.

1.3.3 Subjects of professional activity

The subjects of professional activity are products of basic and fine organic synthesis, devices and equipment of chemical technology for the production and processing of organic substances and materials, various types of raw materials and auxiliary materials, oil, gas, chemical reagents and reagents, research instruments and equipment.

1.3.4 Types of professional activity.

- industrial-technological;
- organizational and management;
- research;
- design.

2. learning outcomes on EP

LO1 Possess the skills of using modern devices of information and computing technology, the ability to use these skills in the field of professional activity; communicate freely in the professional environment and in society in the state, Russian and English languages.

LO2 Use basic knowledge in the field of natural sciences, social, humanitarian, economic disciplines, engineering knowledge, regulatory documents and elements of economic analysis in professional activities.

LO3 Possess basic knowledge in the field of scientific worldview, the history of Kazakh statehood, own the basics of moral, aesthetic and ethical education.

LO4 To be able to predict, analyze and optimize the operation of industrial plants, choose ways to improve existing and develop innovative technological processes based on modern achievements in the field of oil and gas processing technology.

LO5 Manage the technological processes of preparation and processing of oil, gas and solid fossil fuels in accordance with the technological regulations and use technical means to measure the main parameters of technological processes, properties of raw materials and products.

LO6 Carry out laboratory control of the physico-chemical parameters of raw materials and products of oil and gas processing to achieve the required quality of the produced oil products.

LO7 Select and justify the optimal and appropriate production scheme based on the introduction of modern high-tech equipment, in compliance with safety regulations, industrial sanitation, fire safety, labor protection standards and environmental protection requirements.

LO8 Have skills in determine material and heat flows, calculation and selection of the main and additional equipment for the processing, production, transportation and storage of oil and gas and their selection in the design and modernization.

LO9 Plan and carry out the formulation of scientific research, processing the results by methods of mathematical statistics and formulate conclusions.

LO10. Possess the skills of acquire new knowledge necessary for everyday professional activity and postgraduate education, independent and team work of solving research and production problems.

3 COMPETENCIES OF THE EP GRADUATE

3.1 Successful completion of the EP training contributes to the formation of the following competencies in the graduate:

- key competencies (QC)
- professional competence (PC).

Key competence:

(QC1) *in the field of native and foreign languages*

- ability to Express and understand thoughts, feelings, facts and opinions in the professional field in written and oral forms;

(QC2) *fundamental mathematical, natural science and technical training*

- the ability and willingness to apply the educational potential, experience and personal qualities acquired during the study of mathematical, natural science, and technical disciplines at the University and to solve professional problems.

(QC3) *computer*

- the ability to confidently and critically use modern information and digital technologies for work, leisure and communication, to master the skills of using, restoring, evaluating, storing, producing, presenting and sharing information through a computer, and to communicate and participate in collaborating networks via the Internet in the field of professional activity;

(QC4) *social*

- the ability to own social and ethical values based on public opinion, traditions, customs, norms and focus on them in their professional activities; be able to adequately navigate in various social situations; find compromises, correlate their opinions with the opinion of the team; own business ethics, ethical and legal norms of behavior; strive for professional and personal growth; work in a team, correctly defend their point of view, offer new solutions;

(QC5) *economic, entrepreneurial*

- ability to know and understand the goals and methods of state regulation of the economy, the role of the public sector in the economy; possess the basics of economic knowledge; demonstrate entrepreneurial skills.

(QC6) *cultural training*

- the ability to know and understand the traditions and culture of the peoples of Kazakhstan, to be tolerant of the traditions and culture of other peoples of the world, to be aware of the installation of tolerant behavior, to be free from prejudice, to have high spiritual qualities.

(QC7) *additional competencies*

- ability to possess the skills of critical thinking, interpretation, creativity of analysis, drawing conclusions, evaluation; have creativity and an active life position; make professional decisions in conditions of uncertainty and risk;

Professional competence:

PC1 *industrial-technological*

- ability to carry out the technological process in accordance with the regulations and use technical means to measure the main parameters of the technological process, properties of raw materials and products;

PC2 *organizational and management*

- the ability to organize the work of the team in the current production conditions; make management decisions in the field of labor organization and implementation of environmental measures; systematize and summarize information on the formation and use of enterprise resources;

PC3 *research*

-ability to study and analyze domestic and foreign scientific and technical literature; apply modern physical and chemical research methods, plan experimental research, receive, process and analyze the results obtained;

PC4 *design*

-readiness to participate in the design and modernization of individual stages of technological processes, equipment and installations using modern information technologies; to design individual units of installations using automated application systems; to issue project documentation as part of the author's team.

3.2 Matrix of correlation of the learning outcomes in EP as a whole with the formed competencies of modules

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
QC1	+								+	
QC2		+				+		+	+	
QC3	+	+						+	+	
QC4			+		+					+
QC5		+					+			+
QC6			+							+
QC7				+	+					+
PC1				+	+		+	+		+
PC2					+		+			+
PC3	+	+				+			+	
PC4		+					+	+		+

4. SUMMARY TABLE SHOWING THE AMOUNT OF LOANS DISBURSED IN THE CONTEXT OF EDUCATIONAL PROGRAM MODULES

Training course	Semester /trimester	Number of modules to be mastered	Number of disciplines studied			Number of credits KZ				Total hours	Total loans KZ	Quantity	
			EC	UK	OC	Theoretical training	Academic practice	Production / pre-graduate practice	Final certification			exam	deeth. test
1	1/	4	5	2		30				900	30	6	1
	2/	5	3	2	3	30	1			930	31	7	2
2	3/	6	2	3	4	32				960	32	7	2
	4/	5	3		5	28		3/		930	31	7	2
3	5/	4		2	5	30				900	30	6	2
	6/	4		1	3	24		6/		900	30	4	1
4	/7	4			5	20				600	20	4	1
	/8	2			4	20				600	20	4	1
	/9	1						/8	12	600	20		1
total		12	8	10	29	214	1	17	12	7320	244	45	13

5. Information about disciplines

The name of the module	CYCLE	UC/O C	The component name	Brief description of the discipline (30-50 words)	Number of credits	The generate d LO (codes)
Fundamentals of engineering and technical sciences	Basic discipline	Optional component	Mathematical modeling of chemical-technological processes	Modeling methods and areas of their application, structural schemes of chemical technology objects, principles and stages of constructing a mathematical model; mathematical description of chemical transformation processes (kinetic models); processes of moving substances (hydrodynamic models); mathematical model as the basis for optimizing technological processes. Instills skills of modeling chemical and technological processes; analysis of the efficiency of chemical production	4	LO2, LO6, LO9
Chemical engineering	Basic discipline	Optional component	General chemistry	Considers the basic laws of chemistry; the main laws of chemical processes; classification and properties of chemical elements, substances and compounds; purpose and application of basic chemicals and their compounds. Instills skills of using basic elementary methods of chemical research of substances and compounds; basic laws and methods of General chemistry in solving professional problems.	4	LO2, LO6, LO9
			Inorganic chemistry	Considers chemistry as the science of matter; the structure of the atom, the chemical bond and the structure of molecules; elements of chemical thermodynamics; chemical kinetics and chemical equilibrium; dispersed systems, electrochemical processes; chemistry of elements. Develops skills for composing chemical equations, solving problems, performing basic operations of chemical analysis, analyzing experiment results; independently find reference and special literature.		LO2, LO6, LO9
	Basic discipline	Optional component	Physical and colloidal chemistry	Forms knowledge about chemical thermodynamics, chemical equilibrium; properties of water solutions, gases and electrolytes, methods for calculating phase equilibrium; surface phenomena and properties of dispersed systems and colloidal solutions. Instills skills for calculating the main parameters of the ongoing chemical process, making the choice of optimal process parameters.	3	LO2, LO6, LO9
			Qualitative and quantitative analysis	Considers the main types of chemical reactions and processes in analytical chemistry; the theory and chemical reactions used in the gravimetric method of analysis; the theory of titrimetric methods; the main indicators, methods for expressing the concentration of solutions; methods for determining the equivalence point during titration. Develops skills for selecting a method and performing chemical analysis, detecting and identifying ions, and preparing solutions.		LO2, LO6, LO9
	Basic	Option	Industrial organic	Considers the composition, properties, methods of preparation and	6	LO2, LO4,

	discipline	al component	chemistry	processing of natural raw materials used in industrial organic chemistry; the most important products of industrial organic synthesis and modern methods of their production. Develops skills for synthesizing products of industrial organic chemistry in the laboratory; cleaning and establishing the structure of organic compounds, processing the results of laboratory studies.		LO6,LO7
	Basic discipline	Optional component	Structure and reactivity of organic molecules	Considers the basic laws of the reactivity of organic compounds, the reaction mechanism, the relationship of the structure, properties and reactivity of organic substances, the classification of reaction mechanisms and the skills of predicting the reactivity of organic molecules according to classical structural models. Instills the skills of analyzing the main physical methods of establishing the structure: IR, UV and NMR spectroscopy		LO2, LO4,LO6, LO7
	Basic discipline	Optional component	General chemical technology	Considers the main stages of chemical production, criteria for the effectiveness of chemical production; theoretical foundations of chemical technology; basic laws of homogeneous, heterogeneous and heterogeneous-catalytic chemical processes; principles of chemical reactors. Instills skills for calculating and analyzing material and thermal balances of chemical and technological processes; applying basic kinetic parameters to describe elements of technological schemes.	4	LO2, LO4,LO5, LO8
			Regularities of technological processes	Considers the General characteristics and classification of chemical and technological processes; thermodynamic analysis of CTS; restrictions in the Le Chatelier principle on pressure, temperature, and excess of reagents; kinetics of homogeneous and heterogeneous chemical processes, flow areas, and ways to intensify heterogeneous processes in various flow areas. Instills the skills of calculating the equilibrium compositions of the reaction mixture; analysis of factors that limit chemical and technological processes.		LO2, LO4,LO5, LO8
	Basic discipline	Optional component	Processes and devices of chemical technology	Examines the basics of hydraulics, hydrodynamic processes and devices, thermal processes, mass transfer processes, calculation and selection of devices and structures; comparative analysis of the operation of devices, finding the optimal conditions for technological processes. Instills the skills of conducting material and energy calculations of processes and determining the optimal parameters of their management; performing design calculations of the main devices that provide this process.	4	LO2, LO4,LO5, LO8
			Heat and mass transfer processes of chemical technology	Considers the mechanism of transfer of heat and mass transfer processes, the basic equation of processes; the design of the main types of heat and mass transfer equipment; material and thermal balances of drying, crystallization and dissolution. Instills the skills of conducting calculations of heat and mass transfer processes and determining the optimal parameters of their management; performing design calculations of the main devices that provide this process.		LO2, LO4,LO5, LO8

	Basic discipline	Optional component	Engineering Economics and entrepreneurship	Forms knowledge about the types of economic systems and laws of the transition economy; the nature and mechanism of functioning of the market economy; the basics of the theory of supply and demand; business activity. Instills the skills of creating your own business, conducting commercial activities, drawing up legal documents, developing a business plan.	3	LO2,LO7, LO10
			Production organization and management	Considers the organization of the enterprise in the market system of management; types of production, its technical and economic characteristics; production structure; organization of technical control at the enterprise; management of technical preparation of production; the essence, functions and methods of production management. Instills the skills of developing and justifying various management decisions aimed at improving the efficiency of the enterprise, increasing productivity.		LO2,LO7, LO10
	Basic discipline	Optional component	Standardization, certification and Metrology	Considers systems of technical regulation, standardization, ensuring the uniformity of measurements, standards, specifications and other guidance materials on the operation of a technological facility. Develops skills in applying standardization methods, certification schemes, requirements of technical regulations, analysis of compliance with standardization requirements, certification, metrological norms and rules by market entities; assessment of the economic efficiency of work on interstate and international standardization, certification, metrology.	3	LO2,LO6
	Basic discipline	Optional component	Biochemistry	Examines the objects of biochemistry and methods of research; the main stages of the formation of modern biochemistry as an independent science; the chemical composition of living organisms; the importance of microorganisms in oil refining. Instills the skills of conducting chemical analyses to study the properties and identification of the most important natural objects; using the necessary instruments and laboratory equipment for biochemical research.	3	LO2,LO6
			Introduction to the chemistry of biopolymers	Considers biopolymers as a class of high-molecular compounds and the level of their structural organization, based on the concepts of the structure, flexibility and supramolecular structure of polymers; the relationship of biopolymer chemistry with natural Sciences and special disciplines in the field of chemical engineering. Instills the skills of conducting chemical analyses to study the properties of biopolymers.		LO2,LO6
Additional competence module			minor program	Protocol No. 563 of 31.10.2018 additional educational program (Mipog) (minor)—a set of disciplines and (or) modules and other types of educational work, defined by students for study in order to form additional competencies.	12	LO10
	Basic discipline	Optional	Introduction to the specialty	Considering the rules of organization of educational process in University, the main components of the educational process; information about the	4	LO4

Fundamentals of the specialty	e	component		educational program; history of development of oil refining and petrochemistry of Republic of Kazakhstan; basics of processing of hydrocarbon raw materials; Generates knowledge on trends in chemical engineering, introduces innovations in the field of chemical processing technology of oil and gas.		
			History of the industry	Examines the role of oil and gas in human life, the development of oil refining technology as a science, the study of the chemical composition of oil, the history of the development of the oil and gas industry in Kazakhstan. Instills the skills to critically perceive, analyze and evaluate historical information, factors and mechanisms of historical changes in the chemical technology of oil and gas.		LO4
	Basic discipline	University component	Educational practice	Consolidates and deepens the theoretical knowledge, skills and abilities obtained in the chosen specialty; expands ideas about the future professional activity. Introduces industry production facilities, structure and technologies, requirements for the quality of raw materials and products, basic equipment and technology for oil and gas processing.	1	LO4,LO6
	Basic discipline	Optional component	Theoretical bases of hydrocarbon raw material technology	Considers the composition and properties of hydrocarbons; methods for their separation and allocation of target components; physical, physico-chemical and chemical foundations of technological processes. It instills the skills of performing calculations and research on the study of the physicochemical, operational properties of raw materials and oil products; generalization of the results.	4	LO4,LO5, LO6,LO7, LO8,LO9
			Chemistry of natural energy carriers	Considers the composition and physical properties of natural energy carriers; theoretical bases for preparing raw materials for processing, physical methods for separating gaseous and solid raw materials; fuel-disperse systems; basic physical and chemical characteristics of natural energy processing processes and obtaining carbon materials; production of coke and carbon black; theoretical bases of thermal transformations of compounds during processing of natural energy carriers.		LO4,LO5, LO6,LO7, LO8,LO9
	Basic discipline	University component	Production practice I	Consolidates theoretical knowledge of the studied disciplines, applies them to make specific decisions in the workplace. Strengthens the skills of working with analytical equipment, control and measuring equipment, current standards and specifications for raw materials and manufactured products in the laboratories of the research Institute and TSL of oil refining and petrochemical enterprises.	3	LO4,LO5, LO6,LO7, LO8,LO9
Fundamentals of applied Sciences	Basic discipline	Optional component	The management system of chemical-technological processes	Considers automation systems of main technological objects, hierarchical process control systems; the structure of the automated control system, methods and methods for measuring the main technological parameters,	3	LO2,LO5, LO7

		ment		automation systems of technological objects, synthesis of functional automation schemes; hierarchical process control systems. Instills skills of reading typical schemes of automation of technological processes; economic justification of the choice of basic devices and automation devices.		
			Production automation	Considers the basics of automatic control and management; purpose, purpose and functions of the automated control system; automatic control; purpose of automatic control systems; functional diagrams of automatic control systems; devices; automatic control of technological parameters; remote and telemechanical control and management; automation of oil products production. Forms skills of using the latest information technologies for solving problems of automation of technological processes.		LO2,LO5, LO7
Basic discipline	Optional component		Technical analysis of oil and oil fractions	It considers the physicochemical characteristics of oil and oil products, laboratory equipment for their analysis, test / measurement methods to control their quality. It instills the skills of conducting measurements, analyzing the results of laboratory tests / measurements, preparing equipment for metrological certification / calibration / verification, evaluating the reliability of the results, developing chemical processes and production of substances and products, crude oil and oil products.	4	LO2,LO6
			Analytical and environmental control of oil refineries	Examines the theoretical foundations of analytical control of production; Metrology and standardization of analytical control; General guidelines for technical analysis; the main elements and objects of environmental control of oil refineries; chemical, physical and physico-chemical methods of analysis. Instills skills of working with analytical equipment, control and measuring equipment, standards and specifications for raw materials and products.		LO2,LO6
Basic discipline	Optional component		Chemistry and technology of hydrocarbon solvents and oxygenates based on oil and gas raw materials	Examines the properties and methods of production of solvents and oxygenates, the mechanisms of reactions used in the production of solvents and oxygenates; modern ideas about their structure; methods for obtaining raw materials and intermediates for solvents and oxygenates; methods for quality control of solvents and oxygenates. Instills the skills of carrying out synthesis of qualitative and quantitative analysis of organic solvents and oxygenates.	4	LO4,LO5, LO6,LO7, LO8,LO9
				Considers the technological bases of petrochemical synthesis; types of raw materials of petrochemical industries, processes of separation and separation of hydrocarbon raw materials from oil and gas and the basics of petrochemical synthesis technology, the chemistry of the most important petrochemical processes. Instills skills of independent synthesis of petrochemical products in the laboratory.		LO2,LO6
Profile of	Univers		Fundamentals of	Strengthens and deepens theoretical knowledge in practice. Introduces the	6	LO4,LO5,

	discipline	ity component	petrochemical production technology.	actual practical activities of the company. Instills skills in the implementation of the technological process in accordance with the regulations and the use of technical means to measure the main parameters of the technological process, the properties of raw materials and products.		LO6,LO7, LO8,LO9
Fundamentals of scientific research	Profile of discipline	Optional component	Planning and staging of research projects	Considers methods of organization and planning of scientific research, modern methods and means of research of properties and structures of materials; bases of metrological support of measurements and statistical processing of results, rules of registration of the scientific report, article, report. Develops skills to identify topics and initiate research and development, search and analysis of necessary information on the topic of research.	5	LO2,LO4, LO9
			Fundamentals of scientific research and patenting	Examines the organization and stages of research work of students; metrological support of experimental research; processing of experimental results; methods of graphical presentation of research results; registration of research results; fundamentals of patenting. Develops skills for planning and conducting research, preparing scientific articles and reports, conducting comparative analysis of theoretical and experimental data, and working in educational and scientific laboratories.		LO2,LO4, LO9
	Profile of discipline	Optional component	Equipment and design basics for oil refineries	It considers the types of basic equipment of oil refining processes, the principles of its operation and the rules of technical operation, structural elements and materials used for the manufacture of equipment, engineering methods of constructive calculations, design, construction and operation of technological and plant facilities. Forms the skills of drawing up plans for the placement of equipment, technical equipment and organization of jobs.	5	LO2,LO4, LO7, LO8
			Calculation and design of equipment for oil refineries	It considers the problems of selecting materials, calculating strength and stability, and designing the main equipment, its elements and components for oil refineries and petrochemical plants. Instills skills in calculating and designing equipment for oil refineries.		LO2,LO4, LO7, LO8
Basics of processing hydrocarbon raw materials	Basic discipline	Optional component	Petroleum chemistry and laboratory workshop on working professions-chemical analysis laboratory assistant	Considers the relationship between the composition and physico-chemical properties of oil; the impact of oil composition on the quality of oil products, EAEU technical regulations and state / interstate standards for oil and oil products. It instills the skills to perform laboratory analyzes, tests, make the necessary calculations of raw materials, materials, finished products, develop new and improve existing methods of analysis, testing / measurement, analysis of the results and their systematization.	6	LO2,LO6
			Chemistry and technology of base oil production	Considering the composition and methods of feedstock for base oil production; methods of production of commodity components of lubricants; influence of raw material quality on the properties of base oils. Instills skills of practical use of knowledge of methods of production of base oils;		LO2,LO6

				definition of the main characteristics of lubricants; carrying out cleaning of oils for improvement of their quality.		
Profile of discipline	Optional component	Non-destructive technology processing of petroleum raw materials		Examines the technological schemes and norms of the technological regime of the processes of oil preparation for refining; distillation of oils in atmospheric and atmospheric vacuum installations, issues of hardware design of technological processes. It instills the skills of controlling technological parameters according to the technological regulations, eliminating the causes of deviations from the norms of technological regulations, developing measures to improve technological processes that improve the quality of marketable products.	5	LO4,LO5, LO6,LO7, LO8,LO9
		Laboratory course for working professions – the operator of technological installations of oil refining		Develops skills for managing and regulating the technological process with the use of automation tools and analysis results, planning, monitoring and regulating the supply of reagents, fuel, steam, water, electricity in the serviced area, quality control, accounting for the consumption of raw materials, reagents and the quantity of products produced, organizing operational accounting of the technological object.		LO4,LO5, LO6,LO7, LO8,LO9
Profile of discipline	Optional component	Chemistry and technology of destructive processing of crude oil		Considers chemical and technological bases of destructive processes of oil refining: thermal, thermocatalytic, hydrogenation processes that determine its depth: catalytic cracking and hydrocracking of distillate and residual raw materials. It instills the skills of coordinating and controlling the operation of a technological object in accordance with the requirements of technological regulations, eliminating violations of the production process, developing measures to improve technological processes that improve the quality of commercial products.	6	LO4,LO5, LO6,LO7, LO8,LO9
		Catalysis in chemical technology		Considers thermodynamic and kinetic aspects in catalysis; classification of catalytic processes and equipment for their implementation; requirements for catalytic systems, regulation of catalyst parameters. Develops skills for evaluating the efficiency of catalytic systems; selecting equipment based on kinetic data and process speed; and performing chemical and technological calculations.		LO2,LO7, LO9
Profile of discipline	Optional component	Nanosystems and nanomaterials in oil refining		Examines the theoretical basis for obtaining, processing, and research of nanomaterials; methods for studying nanoobjects; methods for obtaining catalytic systems of oil refining by means of nanotechnology; ways and prospects of using nanotechnologies and nanomaterials in fuels and lubricants and in solving environmental problems. Instills skills in predicting the stability and physical and chemical properties of nanoobjects and nanomaterials.	4	LO2,LO4
		Equipment and technology for		It considers technological problems of oil and gas transportation and storage related to the "Liquid-vapor" equilibrium of multicomponent hydrocarbon		LO2,LO4

			transportation and storage of oil and gas	mixtures, pumping of oils mixed with diluents, depressors, transportation of unstable condensate and a wide fraction of light hydrocarbons.. It instills the skills of receiving, storing and shipping oil and petroleum products, testing and acceptance of tanks into operation, their maintenance and repair.		
	Profile of discipline	Optional component	Gas chemistry	Considers the composition and properties of natural gases and gas condensates, issues of processing and transportation of natural gases, primary processing of hydrocarbon gases, production of sulfur from hydrogen sulfide-containing gases, methods for obtaining helium from natural gases, stabilization and processing of gas condensates, processes of chemical processing of hydrocarbon gases. Instills the skills of technological design of gas chemistry processes.	4	LO2,LO4, LO6
			Processes of purification and processing of hydrocarbon gases	Considering the raw material base of gas-processing industry; the composition and origin of natural gas; phase equilibrium of hydrocarbon systems; fundamental equations of state for hydrocarbon gases; methods of dewatering, gas cleaning from hydrogen sulfide, carbon dioxide, and organic sulfur compounds. Instills skills in choosing the method of gas processing.		LO2,LO4, LO6,LO7, LO8
Technology of oil, gas and solid fuels	Profile of discipline	Optional component	Basics of technological calculations of oil and gas processing equipment	It considers calculation methods for determining the physical and chemical properties of oil and petroleum products and the basis of technological calculations of oil and gas processing equipment. Allows you to master the methods of drawing up material and thermal balances of individual devices and installations as a whole; calculation of rectification columns, heat exchangers, tubular furnaces; thermal process reactors; catalytic and hydrocatalytic process reactors; apparatus for oil production plants.	4	LO2,LO7, LO8
			Engineering methods for determining the physical and chemical properties of oil and its components	It considers the physical and chemical composition; phase States, critical parameters, thermal coefficients, physical properties, thermodynamic and thermal properties of oil components and combustion products. Instills the skills to determine the basic physical and chemical properties of hydrocarbons and fractions of compressed oil used in the calculation of mass-heat exchange processes of oil and gas processing, basic organic and petrochemical synthesis.		LO2,LO7, LO8
	Profile of discipline	Optional component	Theoretical and practical bases of rational production and use of petroleum products	Considering the quality and methods of quality assessment of fuels and lubricants, classification and principle of operation of heat engines, the performance properties of fuels and oils; the composition and colloidal structure, methods of control of quality of greases, legal and regulatory framework of standardization and certification of petroleum products, range of petroleum products and their properties, improve their quality. Instills the skills to determine the quality indicators of fuels, lubricants and technical liquids.	4	LO2,LO6, LO9
			Introduction to	Forms scientific ideas about friction, lubrication and wear of solids.		LO2,LO6,

			tribology	Considers modern provisions describing the physical essence of these processes in machine parts and engines, the methodology of rational design and selection of materials for the main rubbing parts of piston engines, aimed at minimizing their friction and wear. Instills skills of calculation and experimental verification of the effectiveness of resource-saving technical solutions.		LO9
Profile of discipline	Optional component		Chemistry and technology of solid fuels	Considers the origin and composition of solid fuels; regularities and methods of processing solid fuels; quality indicators of solid fuels. It instills the skills of analyzing raw materials and products of processing solid fuels in laboratory conditions, organizing the preparation of plans for the introduction of new equipment and technology, improving the technical and economic efficiency of production; planning new workshops and sites, their specialization, the development of new high-performance technological processes	4	LO4,LO5, LO6,LO7, LO8,LO9
			Technological bases of production of carbon materials	Considers the theoretical basis of production, technology of carbon materials and carbon-based composites, the main and auxiliary raw materials for the production of carbon materials and its properties; technological scheme for the production of carbon-graphite materials. Instills skills in the implementation of the technological process in accordance with the regulations and the use of technical means to measure the main parameters of the technological process, the properties of raw materials and products.		LO4,LO5, LO6,LO7, LO8,LO9
Profile of discipline	Optional component		Technology of preparation and production of lubricants	Considers the stages of preparation of raw materials for oil production technological bases and schemes for the production of lubricants; additives to oils; commercial oils. Instills the skills of making specific technical decisions in the development of technological processes, prevention and elimination of violations of the production process, the choice of technical means and technology, taking into account the environmental consequences of their application	5	LO4,LO5, LO6,LO7, LO8,LO9
			Rheology of oil	It considers the main rheological models of fluids used in the calculation of flow regimes of oil and petroleum products, the rheological properties of oil, methods for their experimental determination, and the physical nature of the flow of different types of oil belonging to different rheological classes. Imparts the skills of calculation of parameters of production wells.		LO4,LO5, LO6,LO7, LO8,LO9
Basic discipline	Optional component		Environmental aspects of production and application of products	Examines the composition and characteristics of harmful emissions and waste from oil refineries into the environment, methods of cleaning and recycling them, the impact of power plants, emissions of exhaust gases from internal combustion engines, various vehicles on the environment, and methods for reducing air and soil pollution during storage of petroleum products. Instills skills in the development and implementation of nature-	5	LO2,LO5, LO7

				saving technological processes and modes of production of oil refining products and utilization of gaseous, liquid and solid waste.		
			Environmental safety of oil refining	Considers the main factors of negative impact of hydrocarbon systems, petroleum hydrocarbon systems and environmental aspects of their production and use; energy potential of the enterprise and the level of danger; features of operation of devices with increased fire and explosion hazard; risk and probability of accidents; classification of zones of destruction in the event of an accident at an oil processing plant; prevention of accidents.		LO2,LO5, LO7
	Basic discipline	Optional component	Special technology for the production of motor fuels	Considers advanced domestic and foreign experience in the field of oil technology; ways to intensify installations for delayed coking of oil residues, thermooxidation processes for processing heavy oil residues and solid fuels, hydroblagging and hydrocracking of oil residues, combined installations for deep processing of oil and fuel oil. Instills the skills of analyzing innovative developments in the design and modernization of individual stages of technological processes, equipment and installations.	5	LO1,LO4, LO7,LO8
			Technology of deep processing of oil	Considers the depth of processing as a generalizing indicator of the efficiency of using oil raw materials; the quality of deep processing raw materials, directions and methods for increasing the production of light oil products during processing; thermal processes of deep processing of oil: thermal cracking, coking, catalytic cracking, processing of oil residues. Instills skills to analyze problems of deep oil refining and ways to solve them.		LO4,LO5, LO6,LO7, LO8,LO9
The module final assessment	Profile of discipline	University component	Externship	Strengthens and deepens theoretical knowledge, skills and abilities in the field of professional disciplines; forms skills of practical experience in the specialty; collection and systematization of source materials for the implementation of the diploma project (work).	8	LO1,LO2, LO4, LO5,LO6,
			Writing and defending a thesis (project) or preparing and passing a comprehensive exam	Forms practical skills for conducting analytical review and patent search; independent choice of ways to improve existing technologies and technological processes; mastering the methodology of scientific research in solving specific problems; using new achievements of science and technology in the field of oil refining and petrochemistry; using computer methods for collecting and processing information used in the field of his future professional activity, presentation and protection of work (project).	12	LO1,LO2, LO4,LO7, LO8,LO9, LO10
Additional types of training			Mukhtar studies	Examines the history of the formation and development of the science "Mukhtar studies", the main dates of life and creative activity of M. Auezov, the role and significance of the works of M. Auezov in Kazakh literature. Instills the skills of searching	3	LO3,LO 10

				for and using information about the life and work of M. Auezov; independent research of works, analytical reading of works of art, suggesting a vision of issues and identifying the main artistic means of a text.		
			Abaeology	Examines the biography and works of Abay, creativity, his philosophical, aesthetic and social views; the history of the origin and formation of Abay studies, the main works of Abay scholars; Develops skills of analytical reading of works of art, involving the vision of issues and identification of the main artistic means of a text, instills a sense of patriotism and love for the Motherland		LO3,LO 10
			Current problems and modernization of public consciousness	Considers concepts, forms, features, features, meaning, and main directions of modernization of public consciousness; concepts of competitiveness, pragmatism, national identity, evolutionary development, and new ideology. It forms the skills of preserving national identity, selfless service to the Fatherland, openness of consciousness, readiness for change, openness and receptivity to the best world achievements.		LO3,LO 10

APPROVAL SHEET

by educational program


6B07172 - "Oil and Gas Processing Technology"

Director of DAI


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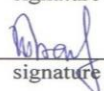
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