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The EP was considered in the direction of training "Engineering and Science in Engineering", at a meeting of the academic committee, Minutes № 6 2023.

Chairman of the Committee Aitureev M.

The EP was considered and recommended for approval at Educational-methodical meeting of M. Auezov SKU

Minutes № 4 from «22» 02 2023.

Chairman of the EMM Abisheva R.D

The EP was approved by the decision of the Academic Council of the University

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## 1 CONCEPT EP

<b>Mission of the University</b>	We are focused on generating new competencies, training a leader who translates research thinking and culture.
<b>University Values</b>	<ul style="list-style-type: none"> <li>– Openness - open to change, innovation and cooperation.</li> <li>– Creativity - generates ideas, develops them and turns them into values</li> <li>– Academic freedom - free to choose, develop and act.</li> <li>– Partnership - creates trust and support in a relationship where everyone wins.</li> <li>– Social responsibility - ready to fulfill obligations, make decisions and be responsible for their results.</li> </ul>
<b>Graduate Model</b>	<ul style="list-style-type: none"> <li>– Deep subject knowledge, their application and continuous expansion in professional activity</li> <li>– Information and digital literacy and mobility</li> <li>– Research skills, creativity and emotional intelligence</li> <li>– Entrepreneurship, independence and responsibility for their activities and well-being</li> <li>– Global and national citizenship, tolerance to cultures and languages</li> </ul>
<b>Uniqueness of the EP</b>	A graduate can successfully work in his chosen field of activity and be in demand in a wide range of the oil and gas industry.
<b>Academic Integrity and Ethics Policy</b>	<p>The University has taken measures to maintain academic integrity and academic freedom, protection from any kind of intolerance and discrimination:</p> <ul style="list-style-type: none"> <li>• Rules of academic integrity (Order No. 212-ҢК dated 10.10.2022);</li> <li>• Anti-Corruption Standard (Order No. 221-ҢК dated 07.12.2021).</li> <li>• Code of Ethics (order No. 212-ҢК dated 10.10.2022).</li> <li>• Anti-Corruption Policy of the NJSC “M. Auezov South Kazakhstan University.” (order No. 144 нк dated 07.14.2022).</li> </ul>
<b>Regulatory and legal framework for the development of EP</b>	<ol style="list-style-type: none"> <li>1. Law of the Republic of Kazakhstan "On Education" No. 319-III dated July 27, 2007;</li> <li>2. Standard rules of activity of educational organizations implementing educational programs of higher and (or) postgraduate education, approved by Order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595</li> <li>3. State obligatory standards of higher and postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated July 20.2022 No. 2;</li> <li>4. Rules for the organization of the educational process on credit technology of training, approved by the Order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152;</li> <li>5. Qualification directory of positions of managers, specialists and other employees, approved by the Order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan on December 30, 2020 No. 553.</li> <li>6. Guidelines for the use of ECTS.</li> <li>7. Guidelines for the development of educational programs of higher and postgraduate education, Appendix 1 to the order of the Director of the Central Research Institute No. 45 o/d dated June 30, 2021.</li> </ol>

<b>Organization of the educational process</b>	<ul style="list-style-type: none"> <li>– Implementation of the principles of the Bologna Process</li> <li>– Student-centered learning</li> <li>– Availability</li> <li>– Inclusivity</li> </ul>
<b>Quality assurance of EP</b>	<ul style="list-style-type: none"> <li>– Internal quality assurance system</li> <li>– Involvement of stakeholders in the development of the EP and its evaluation</li> <li>– Systematic monitoring</li> <li>– Updating the content (updating)</li> </ul>
<b>Requirements for applicants</b>	<p>They are established according to the Standard Rules of admission to training in educational organizations implementing educational programs of higher and postgraduate education Order of the Ministry of Education and Science of the Republic of Kazakhstan No. 600 dated 31.10.2018</p>
<b>Conditions for the implementation of educational programs (EP) for persons with disabilities and special educational needs(SSN)</b>	<p>For students with SEN (special educational needs) and persons with disabilities (PSI), tactile PVC tiles, specially equipped toilets, a mnemonic diagram, and shower bars have been installed in educational buildings and student dormitories. Special parking spaces have been created. Crawler lift installed. There are desks for people with limited mobility (PLM), signs indicating the direction of movement, ramps. In the educational buildings (main building, building No. 8) there are 2 rooms with six working places adapted for users with disorders of the musculoskeletal system (DMS).For visually impaired users, the SARA™ CE Machine (2 pcs.) is available for scanning and reading books. The library website is adapted for the visually impaired. There is a special NVDA audio program with a service. The JIC website <a href="http://lib.ukgu.kz/">http://lib.ukgu.kz/</a> is open 24/7.</p> <p>An individual differentiated approach is provided for all types of classes and in the organization of the educational process.</p>

## 2. PASSPORT of the Educational program

<b>Purpose of the EP</b>	Preparation of a bachelor in demand in the labor market, who owns the basic socio-personal and professional competencies in the oil and gas industry
<b>Tasks of the EP</b>	<ul style="list-style-type: none"> <li>• formation of socially responsible behavior in society, understanding the importance of professional ethical standards and following these standards;</li> <li>• providing basic bachelor's training that allows them to continue their studies throughout their lives, successfully adapt to changing conditions throughout their professional career;</li> <li>• providing conditions for acquiring a high general intellectual level of development, mastering competent and developed speech, culture of thinking and skills of scientific organization of labor in the oil and gas industry;</li> <li>• creation of conditions for intellectual, physical, spiritual, aesthetic development to ensure the possibility of their employment in the specialty or continuing education at subsequent levels of study.</li> </ul>
<b>Harmonization of EP</b>	<ul style="list-style-type: none"> <li>• 6th level of the National Qualifications Framework of the Republic of Kazakhstan;</li> <li>• Dublin descriptors of the 6th level of qualification;</li> <li>• 1 cycle of the Qualification Framework of the European Higher Education Area (the Qualifications System of the European Higher Education Area);</li> <li>• Level 6 of the European Qualification Framework for Lifelong Learning (the European Qualification System for Lifelong Learning).</li> </ul>
<b>Connection of EP with the professional sphere</b>	<ul style="list-style-type: none"> <li>• Professional Standard. Repair of technological equipment – NCE RK "Atameken", 30.12.2019, № 269.</li> <li>• Professional standard. The trials of the NCE RK "Atameken", 30.12.2019, №269</li> <li>• Professional standard. Oil and gas processing- NCE RK "Atameken", 27.12.2019 №266</li> <li>• Professional standard. Ensuring the reliability and mechanical integrity of equipment – NCE RK "Atameken", 27.12.2019, № 266</li> <li>• Professional standard. Ensuring the reliability and mechanical integrity of the equipment. NCE RK "Atameken", dated 06.12.2022, No. 224.</li> <li>• Professional standard. Equipment maintenance and repair management. NCE RK "Atameken", dated 06.12.2022, No. 224.</li> </ul>
<b>Name of the degree awarded</b>	After the successful completion of this EP, the graduate is awarded "Bachelor of Engineering and Technology of the educational program 6B07181 – "Machinery and equipment of the oil and gas industry".
<b>List of qualifications and positions</b>	Coordinator of major repairs of technological installations; engineer for technological installations; engineer for long-term maintenance planning; mechanical engineer for dynamic equipment; engineer for mechanical integrity of equipment; mechanical engineer for planning current and major repairs; mechanical engineer for dynamic equipment; primary positions of master, installer, operator of complex machines and systems, machinist of oil and gas production, designer in design organizations without presenting work experience requirements in accordance with the qualification requirements of the Qualification Directory of positions of managers, specialists and other employees approved by the order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated December 30, 2020 No. 553
<b>Field of professional activity</b>	Areas of the oil and gas industry, the military-industrial complex, as well as design and research organizations.
<b>Objects of</b>	Oil and gas production, innovative and research organizations, firms of various

<b>professional activity</b>	forms of ownership
<b>Subjects of professional activity</b>	Oil and gas machines and equipment; power equipment; technological machines and equipment of various complexes; vacuum and compressor machines, hydraulic machines, hydraulic drives and hydropneumautomatics; technological equipment, means of mechanization and automation of technological processes; production technological processes, their development and development of new technologies; equipment for maintenance and repair of technological machines
<b>Types of professional activity</b>	<ul style="list-style-type: none"> <li>• production and technological;</li> <li>• organizational and managerial;</li> <li>• design and engineering;</li> <li>• installation and commissioning;</li> <li>• service and operational.</li> </ul>
<b>Learning outcomes</b>	<p><b>LO1</b> Communicate freely in the professional environment and society in Kazakh, Russian and English, having the skills of subject-language integrated learning, academic writing, understanding the values of the principles and culture of academic integrity</p> <p><b>LO2</b> Apply natural science, mathematical, social, socio-economic, environmental and engineering knowledge in professional activities, methods of processing scientific and experimental research, regulatory documents and elements of economic analysis.</p> <p><b>LO3</b> Have an understanding of various market structures, analyzing the economy of an enterprise, using legal norms in professional and social activities, possessing entrepreneurship skills, forming anti-corruption worldviews and zero tolerance for any corruption manifestations, applying social knowledge</p> <p><b>LO4</b> Possess information and computing literacy, the ability to generalize, analyze and perceive information, set goals and choose ways to achieve it, using research, entrepreneurial skills and skills to work in non-standard conditions.</p> <p><b>LO5</b> Apply methods of preparation of technological machines for installation, putting forward and justifying proposals for the design of means of mechanization of installation work and modernization of equipment in order to improve its operation.</p> <p><b>LO6</b> To ensure the mechanical integrity, reliability of technological equipment and its operation by applying kinematic schemes of machines, drawing up calculation schemes, designing mechanical transmissions, choosing structural materials for machine parts, using the basic laws and methods of mechanics to solve specific applied problems.</p> <p><b>LO7</b> To carry out the layout of assembly units, certifying the received workpieces after processing, ensuring high reliability and durability of machines, performing drawings of machines and parts of computer graphics using the AutoCAD graphics package.</p> <p><b>LO8</b> Choose equipment for carrying out lifting and transport operations, using complex mechanization and automation, using basic methods and techniques for assembling and welding structures, selecting welding equipment, fixtures and tools.</p> <p><b>LO9</b> Substantiate the choice of modern high-performance machines and apparatuses of the oil and gas industry by providing technical guidance on the operation and repair of technological equipment.</p> <p><b>LO10</b> To ensure the manufacturability of products and the optimality of manufacturing processes, introducing innovative approaches into practice to achieve concrete results, conducting research and introducing them into production.</p> <p><b>LO11</b> Apply knowledge on the purpose, classification, design and principle of operation of machines and equipment, calculating the main technological and design</p>

	<p>parameters</p> <p><b>LO12</b> To develop promising designs of machinery and equipment of the oil and gas industry, taking into account the solution of energy and resource conservation problems, developing measures to improve the safety and environmental friendliness of production activities</p> <p><b>LO13</b> Work effectively individually and as a team member, correctly defend their point of view, correcting their actions and using various methods, expanding the horizons of competencies studied in the framework of the additional program "Minor"</p>
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### 3. COMPETENCIES OF A GRADUATE OF THE EP

<b>GENERAL COMPETENCIES (SOFTSKILLS). Behavioral skills and personal qualities</b>	
GC 1. Competence in managing one's literacy	GC 1.1. The ability to self-study, self-develop and constantly update their knowledge within the chosen trajectory and in an interdisciplinary environment. GC 1.2. The ability to express thoughts, feelings, facts and opinions in the professional sphere. GC 1.3. The ability to mobility in the modern world and critical thinking.
CG 2. Language competence	GC 2.1. Ability to build communication programs in the state, Russian and foreign languages. GC 2.2. The ability to interpersonal social and professional communication in the context of intercultural communication.
GC 3. Mathematical competence and competence in the field of science	GC 3.1. The ability and willingness to apply the educational potential, experience and personal qualities acquired during the study of mathematical, natural science, technical disciplines at the university to solve professional problems.
GC 4. Digital competence, technological literacy	GC 4.1. The ability to demonstrate and develop information literacy through the mastery and use of modern information and communication technologies in all areas of their lives and professional activities. GC 4.2. The ability to use various types of information and communication technologies: Internet resources, cloud and mobile services for the search, storage, protection and dissemination of information.
GC 5. Personal, social and educational competencies	GC 5.1. The ability to physical self-improvement and orientation to a healthy life to ensure full-fledged social and professional activities through methods and means of physical culture. GC 5.2. The ability to socio-cultural development based on the manifestation of citizenship and morality. GC 5.3 The ability to build a personal educational trajectory throughout life for self-development, career growth and professional success. GC 5.4. The ability to successfully interact in a variety of socio-cultural contexts during study, at work, at home and at leisure.
GC 6. Entrepreneurial competence	GC 6.1. The ability to be creative and enterprising in different environments. GC 6.2. The ability to work in the mode of uncertainty and rapid change of task conditions, make decisions, allocate resources and manage your time. GC 6.3. The ability to work with consumer requests.
GC 7. Cultural awareness and self-expression	GC 7.1. The ability to show ideological, civic and moral positions. GC 7.2. The ability to be tolerant to the traditions and culture of other peoples of the world, to possess high spiritual qualities.
<b>PROFESSIONAL COMPETENCIES (HARDSKILLS).</b>	
Theoretical knowledge and practical skills specific to this field	<i>PCI</i> - the ability to develop technical specifications for the design, manufacture, maintenance and repair of machines, systems, drives, non-standard equipment and technological equipment, to choose equipment and production tooling
	<i>PC2</i> – the ability to develop production standards and technological standards for the consumption of materials, blanks, fuel and electricity
	<i>PC3</i> - the ability to assess the technical and economic efficiency of design, research, manufacturing, maintenance and repair of machinery,

	equipment, systems, drives of technological processes, to participate in the creation of a quality management system in the enterprise
	<i>PC4</i> - the ability to develop methodological and regulatory materials, as well as proposals and activities for the implementation of developed projects and programs
	<i>PC5</i> - the ability to carry out the examination of technical documentation

### 3.1 Matrix of correlation of learning outcomes on the EP as a whole with the competencies being formed

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11	LO12	LO13
GC1	+								+				
GC2	+									+			
GC3		+		+									
GC4				+			+						
GC5		+	+										
GC6			+										+
GC7		+	+										
PC1		+		+	+	+	+	+	+		+		+
PC2		+	+	+	+		+			+			
PC3			+	+	+		+		+		+		+
PC4				+	+		+	+			+	+	
PC5	+	+		+	+	+		+	+	+	+	+	

**4. MATRIX OF THE INFLUENCE OF MODULES AND DISCIPLINES ON THE FORMATION OF LEARNING OUTCOMES AND INFORMATION ABOUT THE INTENSITY OF WORK**

№	Module name	CYCLE	BK/KB	Component Name	Brief course description (in 30-50 word)	Number of credits	Generated learning outcomes (codes)															
							LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11	LO12	LO13			
1	Fundamentals of Public Sciences	GED	OC	History of Kazakhstan	<p><b>The purpose</b> of the discipline is formation of an objective idea of the history of Kazakhstan based on a deep understanding and scientific analysis of the main stages, patterns and originality of the historical development of Kazakhstan.</p> <p><b>Content:</b> Ancient people and the formation of a nomadic civilization. The Turkic civilization and the Great Steppe. Kazakh Khanate. Kazakhstan in the era of modern times. Kazakhstan is part of the Soviet administrative and command system. Declaration of independence of Kazakhstan. The state system, socio-political development, foreign policy and international relations. Methods and techniques of historical description for analyzing the causes and consequences of events in the history of Kazakhstan.</p>	5		v						v								
		GED	OC	Philosophy	<p><b>Purpose:</b> The formation of a holistic idea among students about philosophy as a special form of knowledge of the world, about its main sections, problems and methods of studying them in the context of future professional activity. And also the formation of philosophical reflection, introspection and moral self-regulation among students.</p> <p><b>Content:</b> Emergence of a culture of thinking.</p>	5		v						v								

				Subject and method of philosophy. Fundamentals of philosophical understanding of the world: questions of consciousness, spirit and language. Being. Ontology and metaphysics. Cognition and creativity. Education, science, technology and technology. Human philosophy and the world of values. Ethics. Philosophy of values. The subject of aesthetics as a field of philosophical knowledge. Philosophy of freedom. Philosophy of art. Society and culture. Philosophy of history. Philosophy of religion. "Mangilik El" and "Modernization of Public Consciousness" are a new Kazakhstan philosophy														
Socio- 2 Political knowledges		GED	OC	Social and Political Studies	<p><b>Purpose:</b> The goal of forming knowledge about social and political activities, explaining social and political processes and phenomena.</p> <p><b>Content:</b> Consideration of the system of socio-ethical values of the society. Ways to use social, political, cultural, psychological institutions, features of youth policy in the modernization of Kazakhstani society and solve conflict situations in society and professional environment based on them. To study the methods of analysis and interpretation of political institutions and processes, ideas about politics, power, state and civil society, to understand and use the methods and methods of sociological, comparative analysis, to understand the meaning and content of the political situation in the modern world. Analysis and classification of the main political institutions.</p>	4		v										

		GED	OC	Cultural Studies and Psychology	<p><b>Purpose:</b> the formation of scientific knowledge of history, modern trends, current problems and methods for the development of culture and psychology, the skills of a systematic analysis of psychological phenomena.</p> <p><b>Content:</b> Morphology, language, semiotics, anatomy of culture. Culture of nomads, proto-Turks, Turks. Medieval culture of Central Asia. Kazakh culture at the turn of the XVIII - XIX centuries, XX century. Cultural policy of Kazakhstan. State Program "Cultural Heritage". National consciousness, motivation. Emotions, intellect. The will of man, the psychology of self-regulation. Individual typological features. Values, interests, norms are the spiritual basis. The meaning of life, professional self-determination, health. Communication of the individual and groups. Socio-psychological conflict. Models of behavior in conflict.</p>	4		v	v										
3	Socio-ethnic Development	GED	HSC	Ecosystem and law	<p><b>Purpose:</b> Formation of integrated knowledge in the field of economics, law, anti-corruption culture, ecology and life safety, entrepreneurship, scientific research methods.</p> <p><b>Content:</b> Fundamentals of safe human-nature interaction, ecosystem and biosphere productivity. The entrepreneurial activity of society in conditions of limited resources, increasing the competitiveness of business and the national economy. Regulation of relations in the field of ecology and human life safety. Knowledge and compliance of Kazakhstan's law, obligations and guarantees of subjects,</p>	5		v	v										

			state regulation of public relations to ensure social progress. Application of scientific research methods.																
BD	EC	Mukhtar Study	<p><b>Purpose:</b> Formation of a historical, literary idea of M. Auezov's work in the context of literary history, patriotism and cultural and spiritual position. Development of artistic thinking, skills of independent research activity.</p> <p><b>Content:</b> The life and creative path of M. Auezov Semipalatinsk, Tashkent, St. Petersburg periods. M. Auezov's activity in the magazines «Sholpan», «Abai». M. Auezov's journalism. An artistic review of the short stories "Korgansyzydyn kuni", "Kyr suretteri", "Okagan azamat", "Kokserek", the play Enlik-Kebek and the stories "Kili Zaman", "Karash-Karash" okigasy", the monograph "Abai Kunanbayev", the epic novel "Abai Zholy".</p>	3	v	v													
BD	EC	Actual Problems and Modernization of Public Consciousness	<p><b>The purpose</b> of the discipline is the restoration of spirituality, deformed during the periods of tsarist and Soviet reality, the formation of a creative personality based on the modernization of the public consciousness of young people.</p> <p><b>Content:</b> Spiritual modernization: origin and background. Modern national identity. Pragmatism and competitiveness. National identity and national code. Experience and prospects of evolutionary development. The triumph of knowledge and openness of consciousness. Alphabet Reform: Experience and Priorities. Fatherland is the basis of the</p>		v	v													

				state. Education through nationwide sacred places and history. Modern Kazakh culture is the cornerstone of spiritual revival. New humanitarian education and the future national intelligentsia. Abai Kunanbaev and Kazakh society.															
		BD	EC	Abai Studies	<p><b>Purpose:</b> Based on the creativity of A.Kunanbayev, the preservation of the «national code» and in the project «Kazakhtanu»</p> <p><b>Content:</b> historical overview of the history of Kazakhstan and Kazakh literature of the XIX-XX centuries. Studies of Abai's legacy of the XX-XXI century. Chronology of Abai's creativity. Abai is a great poet, ethnographer, founder of Kazakh written literature. Abai is the compiler of the code of laws «The Position of Karamola», social significance. Abai is a thinker, religious scholar, philosopher. The role of Abai in education and science, the concept of a «Holistic person». «Words of Edification» by Abai, an epic novel by M.Auyezova «The Way of Abai» . K. Tokayev «Abai and Kazakhstan in the XXI century», role, significance.</p>		v	v											
		BD	EC	Service to the community	<p><b>Purpose:</b> Formation of socially significant skills and competencies in students based on the assimilation of academic programs, carrying out socially useful activities related to the disciplines studied at the university.</p> <p><b>Content:</b> The concept and meaning of Service learning, the history of the formation and development of the concept of Service</p>		v	v											

				Learning. Key components of Service Learning, socially useful activities in the children's and youth environment, organization of volunteer movement in the world and Kazakhstan practice, profile orientation of Service Learning. International practice of learning through socially useful activities. General principles and methodology for the development of social projects. Methods of analysis of implemented social projects.														
		BD	EC	Foundations of Anticorruption Culture	<p><b>Purpose:</b> Formation of an anti-corruption worldview, strong moral foundations of a personality, civic position, stable skills of anti-corruption behavior.</p> <p><b>Content:</b> Overcoming legal nihilism, formation of the basics of students' legal culture in the field of anti-corruption legislation. Formation of a conscious perception/attitude towards corruption. Moral rejection of corrupt behaviour, corrupt morality and ethics. Development of skills necessary to fight corruption. Development of anti-corruption standards of conduct. Anticorruption propaganda, dissemination of lawfulness and respect for the law. Activities aimed at understanding the nature of corruption, awareness of social damage caused by its manifestation, ability to defend one's position with arguments, seeking ways to overcome manifestation of corruption.</p>													
4	Communication and Physical	GED	OC	Kazakh (Russian) language	<p><b>Purpose:</b> formation of communicative competence using the Kazakh (Russian) language in the socio-cultural, professional</p>	10	v	v										



Education module				<p>and public life, improvement of the ability to write academic texts.</p> <p><b>Content:</b> Levels A1, A2, B1, B2-1, B2-2 (B2, C1 Russian language ) are presented in the form of cognitive-linguocultural complexes, consisting of spheres, themes, sub-themes and typical situations of communication of the international standard: social, social - cultural, educational and professional, modeled by forms: oral and written communication, written speech works, listening. Demonstration of understanding of the language material in the texts on the educational program, knowledge of terminology and development of critical thinking.</p>															
	GED	OC	Foreign Language	<p><b>Purpose:</b> Formation of students' intercultural and communicative competence in the process of foreign language education at a sufficient level A2 and a level of basic sufficiency B1. Student reaches B2level of common European competence if the language level at the start is higher than B1level of common European competence.</p> <p><b>Content:</b> Levels A1, A2, B1, B2 are presented in the form of cognitive-linguocultural complexes, consisting of spheres, themes, sub-themes and typical situations of international standard'scommunication: social, social - cultural, educational and professional, modeled by forms: oral and written communication, written speech works, listening. Demonstration of language material'sunderstanding in texts on</p>	10	v	v												v

			educational program, knowledge of terminology and critical thinking development.																	
	GED	OC	Physical Training	<p><b>Purpose:</b> The formation of social and personal competencies and the ability to purposefully use the means and methods of physical culture that ensure the preservation and strengthening of health in preparation for professional activity; to the persistent transfer of physical exertion, neuropsychic stresses and adverse factors in future work.</p> <p><b>Content:</b> Implementation of physical culture and health and training programs. A complex of general development and special exercises. Sports (gymnastics, sports and outdoor games, athletics, etc.). Control and self-control during classes, insurance and self-insurance. Refereeing competitions, Means of professionally applied physical training. Modern health-improving systems: the breathing system according to A. Strelnikova, K. Buteyko, K. Dinaiki, joint gymnastics according to Bubnovsky.</p>	8		v													v
	BD	HSC	Professional Kazakh (Russian) Language	<p><b>Purpose:</b> To provide professionally oriented language training of a specialist who is able to competently construct communication in professionally significant situations and speak the language norms for special purposes.</p> <p><b>Content:</b> Professional language and its components. Professional terminology as the main feature of scientific style. Scientific vocabulary and scientific constructions in the educational and professional and scientific and professional spheres. The algorithm of</p>	3		v	v												

				work on the analysis and production of scientific texts in the specialty. Production of scientific and professional texts. Fundamentals of business communication and documentation in the framework of future professional activity.														
	BD	HSC	Professionally Oriented Foreign Language	<p><b>Purpose:</b> To train the future specialist in speech skills in the professional language, ethics of professional language communication.</p> <p><b>Content:</b> Introduction to the theory of technical translation. The using of numeral in technical literature: category of numerals. The meaning and role of verb in translation of technical texts: the basic forms of verb. The meaning and role of verb in translation of technical texts: the active and passive voice. Technical-scientific translation and its views.</p>	3	v											v	v
	GED	OC	Information and Communication Technologies (in English)	<p><b>Purpose:</b> formation of the ability to critically evaluate and analyze processes, methods of searching, storing and processing information, methods of collecting and transmitting information through digital technologies. Development of new "digital" thinking, acquisition of knowledge and skills in the use of modern information and communication technologies in various activities</p> <p><b>Content:</b> Introduction and architecture of computer systems. Software. Operating systems. Human-computer interaction. Database systems. Data analysis. Data management. Networks and</p>	5	v			v									

					Telecommunications.Cybersecurity. Internet technologies. Cloud and Mobile technologies. Multimedia technologies. Smart technology. E-technologies. Electronic business. Electronic government.													
5	Fundamental Engineering Technical Sciences	BD	HSC	Higher Mathematics	<p><b>Purpose:</b> To perform the necessary measurements and related calculations, apply theorems, formulas and mathematical methods to solve professional problems.</p> <p><b>Content:</b> Matrices. Determinants. Inverse matrix. Methods for solving systems of linear equations. Vectors. Various equations of a straight line on a plane and a straight line and a plane in space. Curves and surfaces of the second order. Function. Function limit. Remarkable limits. Differential and integral calculus of one variable function. Derivatives and differentials of higher orders. Investigation of function and sketching the graph. Indefinite and definite integrals. Multivariable function. Differential equations of the first and second orders. Series.</p>	5		v			v							
		BD	HSC	Physics	<p><b>Purpose:</b> Formation of knowledge of physical laws and skills of their application in engineering and production technology, development of scientific thinking based on an interdisciplinary approach.</p> <p><b>Content:</b> The laws of classical and modern physics (mechanics, molecular physics, thermodynamics, electromagnetism, optics, quantum and atomic physics). Application of knowledge of physical phenomena and processes for solving applied and technical problems. Scientific research methods,</p>	6		v			v							

				methods for processing and analyzing the results of theoretical and experimental research.														
BD	HSC	Fundamentals Design and Machines Components		<p><b>Purpose:</b> Formation of complex of knowledge, skills, research skills in field of analysis, calculations of machine parts, assemblies, design of machinery and equipment in industry.</p> <p><b>Content:</b> Classification and basic requirements for machine parts and assemblies. Principles and methods of design, stages of development. Design, verification calculations. Multivariate, multi-criteria design. Computer-aided design. Stages of machine design and development of design documentation. Mechanical transmissions. Gearboxes. Shafts and axles. Sliding and rolling bearings. Couplings. Elastic elements. Body parts. Connections. Detachable and non-removable connections.</p>	5						v	v						
BD	HSC	Engineering Computer Graphics		<p><b>Purpose:</b> Formation knowledge, skills and abilities sufficient to compile engineering and design documentation using AutoCAD.</p> <p><b>Content:</b> Projection. Point and straight line. Plane. Axonometric projections. Geometric surfaces and bodies. Basic information on graphic design of drawings. Views, cuts and sections in drawings. Methods of connecting parts. Threaded products. Making sketches of parts. Compilation and design, reading and detailing of assembly drawings and general drawings. Initial setup. Completion and saving images. Building a drawing of a flat figure. Building a drawings of parts. Image Editing.</p>	4		v					v						

			Building a three-dimensional model of an object.																
BD	EC	Technology of Constructional Materials	<p><b>Purpose:</b> Formation of knowledge about the production of ferrous and non-ferrous metals, about the methods of shaping blanks and machine parts from metals and non-metallic materials.</p> <p><b>Content:</b> Fundamentals of metallurgical production. Manufacture of iron and steel. Production of non-ferrous metals and alloys. Powder metallurgy. Foundry technology. Metal forming technology. Hot and cold stamping. Forging, rolling, drawing. Technology of welding production. Physical bases for obtaining welded joints. Physical bases of metal cutting. Cutting methods. Electrophysical and electrochemical processing methods. Technology for the production of blanks and machine parts from non-metallic materials.</p>	4							v	v							
BD	EC	Materials Science	<p><b>Purpose:</b> Formation of knowledge about the atomic-crystalline structure of materials and the laws of its influence on the properties of metals and alloys, the formation of the structure of metals and alloys during crystallization, plastic deformation, heat treatment.</p> <p><b>Content:</b> Structure and properties of metals. Crystallization of metals. Deformation and destruction of materials. Fundamentals of the theory of alloys. State diagrams of alloys. Steel and cast iron. Theory and technology of heat treatment of materials. Chemical-thermal treatment of steel. Structural and tool</p>																

				steels. Steels and alloys for special purposes. Non-ferrous metals and alloys. Basic non-metallic materials and composites.															
	BD	EC	Theoretical Mechanics and Strength of Materials	<p><b>Purpose:</b> Master general laws, methods of theoretical mechanics, materials resistance; form skills of using theoretical provisions of discipline in solving professional problems.</p> <p><b>Content:</b> Main provisions of statics, force vector concept, force projection on axis, moment of forces pair. Motion laws of solids - trajectory of body, speed, acceleration. Differential equation of point motion, dynamics main problems. Main hypotheses, assumptions of materials resistance are axial tension-compression, transverse bending, shear, torsion, complex types of deformations, stress-strain state, fatigue failure, stability of systems.</p>	5						v	v							
	BD	EC	Analytical mechanics	<p><b>Purpose:</b> Formation of knowledge in field of studying laws of mechanical phenomena related processes taking place in machines, devices, structures, elements by analytical mechanics methods.</p> <p><b>Content:</b> Analytical mechanics basic concepts. Connections of mechanical system, equations. Generalized velocities, accelerations. Possible, virtual movements. Analytical statics. Lagrange principle. Equilibrium conditions in generalized coordinates. Analytical dynamics. D'Alembert principle for material point. Impact theory. Stability of equilibrium of mechanical system. Mechanical system small free oscillations. Application of</p>															

				mathematical modeling of machines, apparatuses, objects, supporting elements.															
		BD	EC	Theory of Mechanisms and Machines	<p><b>Purpose:</b> Formation of knowledge about general research, machines, devices design methods, general principles of mechanisms interaction in a machine due to their kinematic, dynamic properties, about basics of structural, kinematic, dynamic analysis, synthesis of mechanisms.</p> <p><b>Content:</b> Main elements of block diagram. Kinematic pairs, chains, their classification. Main types of mechanisms. Formation principle of lever mechanisms. Assur structural groups, classification. Main tasks, methods of kinematic, force analysis of mechanisms. Balancing mechanisms. Mechanisms dynamic analysis. Mechanisms synthesis, its methods. Manipulators, industrial robots.</p>	4						v	v						
		BD	EC	Mechanics of machines	<p><b>Purpose:</b> Formation of knowledge about properties of mechanical systems, mechanical processes occurring in machine, about software control systems in machines, optimal solutions ensuring required quality of designs being developed, research skills.</p> <p><b>Content:</b> Classification of kinematic pairs, chains, mechanisms. Lever mechanisms analysis, synthesis. Mechanism kinematic scheme, its parameters. Assemblies, quality criteria for motion transmission. Classification of tasks, methods of synthesis. Precision of gear pairs, kinematic chains. Introduction to machines dynamics. Machines dynamics with rigid, variable</p>							v	v						



				links. Industrial robots structure, kinematics, dynamics.														
		BD	HSC	Standardization, Certification and Metrology	<p><b>Purpose:</b> Formation of theoretical knowledge and practical skills in the field of standardization, certification and metrology to solve problems of ensuring the uniformity of measurements and quality control of products, services and works in their professional activities</p> <p><b>Content:</b> Objects of standardization, certification and metrology. Legislative and regulatory framework for standardization, technical regulation, metrology and conformity assessment systems. General scientific and special methods of standardization. Certification and declaration schemes. Methods and types of measurements. Calculation of errors and uncertainty of measurements. Technical basis of metrology. The role of international management systems in improving the competitiveness of enterprises.</p>	4				v		v		v				
6	Module of service and exploitation machines	ChD	EC	Assembly and Operation of Technological Machines	<p><b>Purpose:</b> The study of the discipline aims to the aim is to teach the future specialist to make sound engineering decisions when operating and installing technological machinery and equipment.</p> <p><b>Content:</b> Organisation of assembly and rigging work. Modern methods of operation and installation of technological equipment. Basic scientific and technical problems of operation, preparation and design of technological machines and equipment. Basic rules and regulations of the operation</p>	5					v			v				v

			and installation of technological machines and equipment. Established requirements for the operation and installation of technological machines, complexes and units. Technical devices for monitoring and diagnostics. Lubrication of technological equipment, lubricants. Inspection of foundations for installation of equipment. Balancing. Methods of balancing rotating parts. Types of balancing. Shaft alignment.															
ChD	EC	Sequence of installation works and preparation for operation of technological machines	<p><b>Purpose:</b> Take theoretical bases and gain practical skills in the selection, calculation and development of technology for processing machines and devices in the chemical industry</p> <p><b>Content:</b> Possession of methods of installation and operation of technological machines and devices. Makes wiring diagrams of technological machines. Studies the safety regulations in the operation of supporting structures, lifting machines and mechanisms, the construction of foundations, rigging works, alignment and mounting equipment on supports. Able to put forward and justify proposals for the design of means of mechanization of installation work and modernization of equipment in order to improve its operation.</p>						v				v					v
BD		Training Practice	<p><b>Purpose:</b> To consolidate and deepen students' theoretical knowledge, to gain practical skills and competencies, as well as experience in independent professional activity.</p> <p><b>Content:</b> Study of the basics of professional</p>	1						v			v					

			activity, introduction to the specialty. Typical locksmith operations used in the preparation of metal for welding. Welding of products, technologies of the main types of welding, quality control of joints. Various methods, methods and techniques of assembly and welding of structures; technical preparations for the production of welded structures. Thermal and technological properties of a gas flame and their use in gas welding processes, oxygen cutting and other types of heat treatment.														
ChD	EC	Repair of Technological Machines	<p><b>Purpose:</b> To study and master methods and means of organization and carrying out diagnostics and repair of technological machines in the production process control system.</p> <p><b>Content:</b> General information. Organization of repair work. Modern methods of restoration of machine parts. Technology of repair of products made of non-metallic materials. Technological process of equipment repair. Repair of housings and linings. Repair of standard units of industrial equipment. Repair of standard technological equipment. Repair of transporting devices. Repair of pumping and compressor equipment. Repair of pipelines. Ways to improve repair production.</p>	5								v	v				v
ChD	EC	Restoration of Technical Resource of Technological Machines	<p><b>Purpose:</b> Formation of knowledge, skills and abilities in the field of restoration of the technical resource of technological machines.</p> <p><b>Content:</b> Maintenance of technological machines and equipment. Methods and</p>									v	v				v

				methods of control and restoration of parts and machines. Methods and means of non-destructive testing of parts, assembly units and technical diagnostics of the condition of machines. Restoration of parts by locksmith and mechanical processing. Restoration of parts by welding and surfacing. Electromechanical methods of restoring parts. Restoration and repair of threaded surfaces. Registration of technological documentation for the restoration of parts.													
BD	EC	Welding Business	<p><b>Purpose:</b> To possess theoretical and practical knowledge of welding equipment structures, study methods of welding permanent joints.</p> <p><b>Content:</b> Fundamentals of welding production. Classification and types of welding. Welding equipment for arc welding methods. Manufacturing technology of welded structures. Preparatory operations before welding. Quality control of welded joints. Electric arc cutting of metal. Deformations and stresses during welding. The main defects of welds and their causes. Features of arc welding of carbon and alloy steels. Transformer connection rules. Tools, accessories and workwear of an electric welder. Welding wire and electrodes. Safety precautions during welding operations.</p>	4						v	v						v
BD	EC	Gas Welding	<p><b>Purpose:</b> To study the theoretical foundations and practical application of gas welding in industry.</p> <p><b>Content:</b> Gas welding technique and technology. Methods of gas welding. Materials</p>							v	v						v

				for gas welding. Gases used in welding. Gas welding of carbon and alloy steels. Gas welding of cast iron. Welding of non-ferrous metals and their alloys. The technology of oxygen cutting of metals. Defects in welds and joints during gas welding. Methods of correcting defects in gas welding. Safety precautions for gas welding.															
7	Module of basis of speciality	BD	EC	Current Status and Introduction to the Oil and Gas Industry	<p><b>Purpose:</b> Providing student orientation in conditions corresponding to the specifics of the university, to give basic concepts about scientific and technical problems of development and the current state of technological machines for various industrial purposes.</p> <p><b>Content:</b> To familiarize students with the system of organization of the educational process, its activities, regulatory documents of the field of education. Credit technology of training. Goals and objectives of the Bologna Process. Features of the teaching methodology at the university. Basic chemical processes and equipment. Machines for transporting liquids and gases. Machines for mixing liquid media. Devices for conducting thermal processes. Devices for carrying out mass transfer processes</p>	3											v	v	v
		BD	EC	Fundamentals of Academic Writing	<p><b>Purpose:</b> To form knowledge about the main tasks and principles of academic writing and apply them in their professional activities.</p> <p><b>Content:</b> Academic literacy and its importance for professional activity. The main objectives and principles of academic writing. Basic elements and units of academic text.</p>			v	v										v

				Writing academic and scientific texts. Types of scientific texts: scientific article, scientific report, abstract, abstract, review; grant application. Work on various elements of a scientific text. Principles of construction of a scientific text and its preparation for publication. Requirements for checking for anti-plagiarism.														
	BD	EC	Thermal Energy Integration of Technological Processes	<p><b>Purpose:</b> Formation of knowledge of energy and resource saving, as well as rational use, organization and optimization, about the main recommendations and activities.</p> <p><b>Content:</b> Regulatory and methodological support of energy saving. Organization and optimization of energy and resource saving. Criteria methods for optimizing energy and resource saving processes. Rational use of material and energy resources in chemical technology. Processes of recovery of mechanical and thermal energy. Fundamentals of energy saving in heat exchange and heating installations. Progressive sources of energy for thermal power plants. Energy-saving measures in heating, ventilation and air conditioning systems. Energy audit and pinch analysis. Evaluation of equipment energy efficiency. Basic recommendations and measures for energy saving.</p>	4												v	v
	BD	EC	Optimization of Technological Schemes Based on Process	<p><b>Purpose:</b> Mastering the methods of multicriteria optimization of energy and resource saving, technological processes.</p> <p><b>Content:</b> Regulatory and methodological support of energy saving. Strategy for organizing and optimizing energy saving.</p>													v	v

			Integration	Theoretical foundations for building intelligent systems for organizing and optimizing energy-resource-saving technology processes. System multi-criteria analysis of production efficiency. The main directions of energy saving, rational use of material and energy resources in production. Basic methods of rational use of resources. Energy saving through the use of alternative energy sources and secondary energy sources. Basic organizational and technical measures of energy saving. Development of key proposals and measures for energy saving.														
	BD	EC	Hydro-mechanical and Mechanical Equipment of Industry	<p><b>Purpose:</b> To study the hydro-mechanical and mechanical equipment of industry for its subsequent selection, calculation, design and operation.</p> <p><b>Content:</b> Equipment for conducting mechanical and hydromechanical processes. Types of heterogeneous systems. Machines for transporting liquids and gases. Equipment for separation of liquid heterogeneous systems. Devices for cleaning gas inhomogeneous systems. Devices for mixing liquid media. Equipment for crushing and crushing materials. Equipment for sorting materials.</p>	6									v	v	v		
	BD	EC	Machines for grinding and separation of solid materials	<p><b>Purpose:</b> To study equipment for grinding and sorting of solid materials for its subsequent selection, calculation, design and operation.</p> <p><b>Content:</b> Grinding processes. Physical and mechanical properties of materials. Classification of machines for grinding and separating materials. Machines for crushing</p>										v	v	v		

				materials: crushers that destroy material by compression; impact crushers. Machines for grinding materials: drum ball mills; medium-speed mills, mills for particularly fine grinding. Machines for mechanical, air, hydraulic sorting of materials.														
BD	EC	Equipment for Drying Solid Materials	<p><b>Purpose:</b> Formation of ideas and skills about the process of drying materials, material and heat balances of the drying process, the choice of dryers for a specific production or drying process.</p> <p><b>Content:</b> Theoretical foundations of the drying process of solid materials. Basic parameters of wet gas. Determination of material and heat balances of the drying process, air and heat consumption for drying. Drying options. Classification of drying equipment. Designs, principles of operation and application of convective, pneumatic, drum, contact, roller, spray, special dryers. Parameters of the vapor-gas mixture in the main drying plants. Selection of accessories for the dryer. Hydrodynamic characteristics of the drying layer. Study of the operation of closed-type dryers. Selection of types of dryers.</p>	6										v	v	v		
BD	EC	Equipment carrying out process granulation	<p><b>Purpose:</b> Formation of ideas and skills about the processes of granulation and separation of materials, material and thermal balances of granulation and separation processes.</p> <p><b>Content:</b> Theoretical foundations of the process of granulation of materials. Basic parameters of wet gas. Material and heat balances of the granulation process. General</p>											v	v	v		



					concepts of the granulation process. Classification of granulators and auxiliary equipment. Designs, principles of operation, application of granulators and auxiliary equipment. Parameters of the vapor-gas mixture in the main drying plants. Selection of auxiliary equipment for granulation plants.														
8	Scientific foundations of the creation of machines	ChD	EC	Hydraulic machines and compressors	<p><b>Purpose:</b> To possess knowledge in the field of device, principle of operation, calculations of the most common types of pumps and compressors used in industrial enterprises.</p> <p><b>Content:</b> General classification of hydraulic machines. The main technical indicators of pumps. Principles of operation and design features of pumps. Classification of dynamic pumps. The device of centrifugal and axial pumps. Classification of volumetric pumps. Piston pumps. Rotary pumps. Calculation of the main parameters of pumps. Machines for moving and compressing gases. Classification of compressors. Reciprocating compressors. Centrifugal compressors. Rotary and axial compressors. Calculation and selection of compressor equipment.</p>	4												v	v
		ChD	EC	Pumps, Fans and Compressor Units	<p><b>Purpose:</b> To study the schematic diagrams, operational characteristics and designs of pumps, fans and compressor units.</p> <p><b>Content:</b> Classification, application of pumps, fans, compressors. Parameters of pumps, fans, compressors. Theory of operation of centrifugal pumps and fans. Designs of industrial centrifugal pumps, the principle of operation. Centrifugal fans. Axial pumps and</p>													v	v

				fans. Volumetric piston and rotary pumps. Special types of pumps. Centrifugal, vane, axial, reciprocating, rotary compressors, their designs, stages, performance characteristics, power.														
	BD	EC	Ecological Equipment of Industrial Enterprises	<p><b>Purpose:</b> Formation of knowledge about the basics of technological processes, equipment and technical means designed to protect the environment.</p> <p><b>Content:</b> Engineering methods of environmental protection from man-made pollution. Technique of protection of atmospheric air. Devices for dry and wet cleaning of industrial gases. Electrical methods of gas purification. Equipment, technological schemes and installations for wastewater treatment of industrial enterprises. Recycling of solid industrial waste.</p>	4		v											v
	BD	EC	Principles of Waste-free Industrial Production	<p><b>Purpose:</b> Formation of knowledge and skills necessary to create modern waste-free and low-waste technologies.</p> <p><b>Content:</b> Waste-free production is the basis of industrial ecology. Principles of organization of low-waste and waste-free production. Requirements for waste-free production. Methods of development of waste-free technological processes. Use of secondary material resources. The main directions of development of waste-free and low-waste technology in certain industries. Processes and installations for processing industrial waste.</p>			v											v
	BD	EC	Technology of Apparatus Construction	<p><b>Purpose:</b> Formation of competencies to create optimal technological processes for the preparation of devices that meet the</p>	4						v		v	v				

				requirements of high performance at low cost and provide high performance. <b>Content:</b> General technical requirements for the manufacture and design of devices and devices in industrial production. Factors influencing the manufacturing technology of devices during the introduction of innovative technologies. Preparation of the workpiece and hole processing. Heat treatment. Methods of root preparation and equipment used. Assembly methods.														
BD	EC	Fundamentals of Designing of Technological Devices	<b>Purpose:</b> Apply knowledge to make optimal, technically competent decisions that meet specific situations that arise in the process of creating industrial equipment. <b>Content:</b> Design and technological development of new equipment with improved design characteristics. The main factors influencing the design of machines when introducing new technologies. Factors influencing the technology of assembly and assembly of devices in the implementation of innovative techniques and technologies. Measures aimed at fulfilling the requirements of regulatory legal acts for the design of devices. General technical requirements for the assembly and design of devices in industrial production.							v		v	v					
ChD	EC	Fundamentals of Scientific-Research and Educational-	<b>Purpose:</b> To develop students' research skills, to introduce students to scientific knowledge, their readiness and ability to conduct research. <b>Content:</b> Scientific research as a kind of creative activity. Information and	4		v		v									v	

		Research Work of Students	<p>bibliographic resources. Types and forms of educational research and research work. Preparatory stage of research work. Features of preparation and protection of educational and research works. The choice of the topic of scientific research. Search, collection and processing of scientific information. Requirements for the technical design of scientific work.</p>														
ChD	EC	Fundamentals of patenting	<p><b>Purpose:</b> Formation of theoretical knowledge in the field of intellectual property and the organization of patent business among future specialists; application of the acquired knowledge in the practice of engineering work at the enterprises of the industry.</p> <p><b>Content:</b> Intellectual property objects, their classification. Copyright and related rights. Industrial property and its legal protection. Registration of patent rights for inventions, utility models, industrial designs. The formula of the invention and its meaning. The rights of the authors of the invention, utility model, industrial design. Patent information and its uses.</p>			v		v							v		
ChD		Practical Training for Students I	<p><b>Purpose:</b> To consolidate the knowledge gained by students in the educational process based on the study of work experience at the enterprise in the specialty direction, as well as the acquisition of production skills.</p> <p><b>Content:</b> The main types and designs, physico-chemical processes occurring in the elements of technological equipment. Study of the organization of repair and mechanical</p>	4						v							v

					services of the enterprise. Purpose and principles of operation of turning, milling, grinding, drilling, boring and other production machines. Devices and installations for gas cleaning and dust collection; schemes, methods and equipment for wet and dry cleaning of gas and air media.													
9	Fundamental calculation, design and manufacturing machines and devices of Petroleum Gas Industry	BD	EC	Calculation of the Strength and Stability of the Apparatus of the Oil and Gas Industry	<p><b>Purpose:</b> To study the theoretical foundations and gain practical skills in the calculation and design of elements of machines and apparatus of the oil refining industry</p> <p><b>Content:</b> General principles of designing machines and apparatuses. Fundamentals of shell theory. Engineering methods for calculating the elements of devices under various loads. Column-type apparatuses. Heat exchange equipment. Vessels and devices with a jacket. High-pressure devices. Calculation of devices with rotating elements and parts subject to fluctuations. Calculation of the supports of the devices. Drum-type devices.</p>	5						v					v	v
		BD	EC	Strength Calculations of the Equipment of Oil Refinery Plants	<p><b>Purpose:</b> to contribute to the development of scientific and technical thinking of the future specialist and to master the necessary knowledge and practical skills in the field of calculation and design of equipment of oil refineries by students</p> <p><b>Content:</b> Calculation and design of the main types of equipment of oil refineries. Development of design and technological documentation. Methods of assessing the quality of industrial products. Methodology, structure and design stages of oil refining equipment; Layout, kinematic and structural</p>							v				v	v	

			schemes of mechanisms, machines, aggregates and complexes.																
	BD	EC	Processes and Apparatus of Oil and Gas Processing and Petrochemistry	<p><b>Purpose:</b> The study of lifting and transport machines in oil and gas enterprises, methods of their selection, calculation and design.</p> <p><b>Content:</b> Classification of the main processes and devices of oil refining and petrochemistry technology and the main requirements for them. Hydromechanical processes and apparatuses. Deposition. The filtering process. Gas purification processes. Mixing in a liquid medium. Hydrodynamics of the suspended layer. Heat exchange processes and apparatuses. General characteristics of the thermal process. Mass exchange (diffusion) processes and apparatuses are the main regularities of mass exchange. Rectification. Adsorption and desorption. Extraction. Adsorption. Drying process</p>	6											v	v	v	
	BD	EC	Processes and Apparatus in the Oil and Gas Industry	<p><b>Purpose:</b> To justify the choice of lifting vehicles for mechanization of labor-intensive processes at oil and gas enterprises</p> <p><b>Content:</b> Lifting equipment. The simplest lifting and transport machines. Lifting cranes. The main parameters of lifting and transport machines. Cargo handling devices for bulk cargo. The mechanism of lifting loads. Diagram of the lifting mechanism. The mechanism of changing the departure of the arrow. Transporting machines. Types and designs.</p>												v	v	v	
	BD	EC	Reliability of Technological Machines	<p><b>Purpose:</b> The basics of reliability of technological machines; methods of theoretical and practical use of knowledge</p>	4					v	v		v						

		of Petroleum-gas Industry	<b>Content:</b> The importance of the reliability problem for modern machines. Basic theory of machine reliability. Typical technology. Types of technological schemes and stages of chemical production. Monitoring and maintenance, diagnostics of the condition of the equipment. The importance of equipment reliability in modern production. Basic terms and concepts															
	BD	EC	Improving the Reliability of Oil Refining Equipment	<b>Purpose:</b> Develops skills on operational reliability of technological machines and equipment of the oil and gas industry. <b>Content:</b> Basic concepts of reliability theory, mathematical foundations of reliability theory. Classification of quantitative reliability indicators and approaches to their selection. Methods of structural analysis of technological equipment systems.						v		v			v			
	BD	EC	Design of Oil and Gas Facilities	<b>Purpose:</b> In-depth study of the design of block-modular equipment in the oil and gas industry. <b>Content:</b> Basic principles of designing block-complete objects of the oil and gas industry. Structural and layout solutions of individual block devices and objects. Block-modular equipment for the oil and gas industry. The technological part of the project. Basic design schemes of block devices. Technical requirements for block devices.	5												v	v
	PD	EC	Design of Modular Equipment in the Oil and Gas Industry	<b>Purpose:</b> Formation of skills in designing technological lines of food enterprises related to the choice of a rational type of machines and apparatuses, compliance with the rules and norms of design.													v	v

				<p><b>Content:</b> Fundamentals of technological design of machines and aggregates of food production. Principles and methods of design. Development of technological schemes for various food industries. Development of the machine and hardware scheme of the technological line. General principles of analysis, calculation and selection (development) of technological equipment. Development of a workshop plan with equipment placement.</p>														
	PD	EC	Lifting – Transport Machines	<p><b>Purpose:</b> Study of lifting equipment and transporting machines, structures of jacks, winches, hoists, elevators, bucket lifts of various types of cranes, methods for calculating the main parameters.</p> <p><b>Content:</b> Lifting equipment. Jacks, winches, hoists, elevators, bucket lifts, purpose, structures, classification. Cranes: bridge cranes, gantry cranes, semi-gantry cranes, tower cranes. Calculation of lifting machines: load capacity, speed of movement, lifting, movement, operating mode, productivity, design loads, permissible stresses.</p>	5								v				v	
	BD	EC	Main Mechanisms of Lifting-Transport Machines	<p><b>Purpose:</b> The study of the components of the equipment: lifting devices for piece and bulk cargo, elements of cargo and traction devices, stops and brakes.</p> <p><b>Content:</b> Lifting devices: Hooks and hinges. Special grips. Cargo handling devices for bulk cargo. Elements of cargo and traction devices: Ropes. Chains: welded and lamellar. Polispasts (power and speed). Schemes of polispasts. Stops and brakes (pad and belt).</p>									v				v	



				Braking devices for speed control.															
	BD	EC	Technology of Mechanical Engineering of Petroleum - Gas Industry	<p><b>Purpose:</b> To learn how to design technological processes for manufacturing the main types of parts found in mechanical engineering and to give knowledge about typical technological processes and their features depending on the type of production.</p> <p><b>Contents:</b> Basic concepts and definitions of oil and gas engineering production. Fundamentals of basing and dimensional chains. Technological support of material properties and accuracy of the part. Improving the technical and economic efficiency of manufacturing parts. Fundamentals of the development of the technological process of manufacturing parts. Fundamentals of product assembly technology</p>	6							v						v	v
	BD	EC	Engineering Fundamentals of Mechanical Engineering in the Oil and Gas Industry	<p><b>Purpose:</b> Study for the application of methods for the development of technological processes for the assembly of machines and technological processes for the manufacture of parts of any type in conditions of single, serial and mass production.</p> <p><b>Content:</b> Analysis of technical conditions for assembly units, calculation of assembly dimensional circuits, design of assembly processes, machining of typical machine parts, standardization of technological processes, preparation of technological documentation. methods of development of technological processes of assembly and manufacture of parts of any type in mass, serial and single production, basic provisions and approaches to automation of assembly and machining</p>								v						v	v

				operations.																		
ChD	EC	Engineering Fundamentals of Creating Petroleum-Gas Facilities	<p><b>Purpose:</b> Familiarization with the methods of making technical solutions and preparing them</p> <p><b>Content:</b> Requirements for machines in the oil and gas industry. Quality of production products. Content and stages of design and design. Design documents of technical proposals. Sketch project, their content and documents. Technical project. Design documents of a technical project. Requirements for documents of technical projects. Areas of application of the unified system-standards of design documents. Quality indicators. Quality assurance measures. Signs of development of a technical object. Design documents at the design stage</p>	4													v	v				
ChD	EC	Creation of Machines and Modernization of Equipment of Oil and Gas Industry	<p><b>Purpose:</b> Familiarization of students with the system of indicators that determine the quality of competitive machines in accordance with modern requirements</p> <p><b>Content:</b> Achievements, features and history of origin of oil and gas industry machines. The place of the machine-building industry in improving scientific and technological progress. The function of machines and mechanisms and their classification. The concept of the quality of manufactured products. Quality assurance measures. Requirements for design documents of a sketch project. Design documents. Types of design documents.</p>															v	v			
ChD	EC	Heat and Mass Transfer	<p><b>Purpose:</b> Development of additional professional competencies to improve the efficiency of engineering activities in the oil</p>	6														v	v	v		

			Equipment of Oil and Gas Industry	and gas industry. <b>Content:</b> Requirements for machines and equipment of the oil and gas industry. Structural types of hydromechanical processes and apparatuses. Structural types of heat exchangers in the oil and gas industry. Mass transfer devices of the oil and gas industry The role of mass transfer devices in the oil and gas industry. General signs of mass transfer devices. Evaporation and condensation. Rectification of multicomponent mixtures. The main types and calculation of rectification and absorption columns. Adsorbers. Extractors Calculation of the main sizes of extraction devices. Drying machines and installations. Requirements for machines and equipment of the oil and gas industry. Structural types of hydromechanical processes and apparatuses. Structural types of heat exchangers in the oil and gas industry. Mass transfer devices of the oil and gas industry The role of mass transfer devices in the oil and gas industry. General signs of mass transfer devices. Evaporation and condensation. Rectification of multicomponent mixtures. The main types and calculation of rectification and absorption columns. Adsorbers. Extractors Calculation of the main sizes of extraction devices. Drying machines and installations.														
	ChD	EC	Machinery and Equipments of Oil and Gas	<b>Purpose:</b> Familiarity with the accumulated methods and methods of effective equipment design of modern standard types of machinery and equipment of modern oil and gas									v		v		v	

			Industry	industries. <b>Content:</b> Requirements for machines and equipment of the oil and gas industry. Structural types of hydromechanical processes and apparatuses. Structural types of heat exchangers in the oil and gas industry. Shell-and-tube heat exchanger. The heat exchanger is a pipe in a pipe. Devices for cooling. Column apparatuses and types. The design of the distillation column. Types of mass transfer plates and nozzles.														
ChD	EC	Technological Equipment of Petroleum - Gas Branch	<b>Purpose:</b> Study of processes and equipment for oil and gas refining, preparation of oil for processing, natural gas purification. <b>Content:</b> Oil refining. Preparation of oil for processing. Installation of oil stabilization in the field. The main facilities of oil refineries. Electric desalination of oil. General information. Technological scheme of electrical desalination. The main equipment of the ELOU installation. Operation of the ELOU installation. Gas fractionation. General information. Technological scheme of gas fractionation.	7											v	v		
ChD	EC	Installations of oil and gas processing	<b>Purpose:</b> Study of the processes of oil and gas preparation for processing, electric desalination of oil, primary distillation of oil and secondary distillation of distillates, catalytic reforming of gasoline fraction, hydrotreating of fuels; gas fractionation and drying and odorization of gas. <b>Content:</b> Processing of gas and oil. Raw materials and gas processing products. Purification of natural gas from mechanical												v	v		

				impurities, water, hydrogen sulfide and carbon dioxide. Methods of gas purification from mechanical impurities. Designs of dust collectors: vertical oil dust collector, gravity separators, filter separators. Hydrogenation processes. Installation of hydrotreating of petroleum oils. Hydrogenation processes. Hydrotreating of heavy and vacuum gas oils.														
		ChD	Practical Training for Students II	<p><b>Purpose:</b> Familiarization with the peculiarities of the functioning of a particular enterprise; systematization, consolidation and expansion of theoretical knowledge for solving production tasks.</p> <p><b>Content:</b> Considers methods of multi-criteria optimization and development of energy- and resource-saving chemical-technological processes. Actual problems of industrial enterprises related to the design, development and improvement of the design of technological machines and equipment. Conducting literary and patent research on the chosen topic. Study of technological features of repair of standard assembly units and modern methods of restoration.</p>	6					v			v					v
10	Module of New Professional Competence Acquisition	BD	EC	<p>Subjects on the Additional Educational Program</p> <p><b>Purpose:</b> Development of additional professional competencies in the field of chemical and related industries.</p> <p><b>Content:</b> Readiness for the development and operation of new equipment, taking part in the establishment, technical inspections, routine repairs, checking the technical condition of the equipment in compliance with the rules of safety, industrial sanitation, fire safety and labor protection standards at enterprises.</p>	12								v					v

				Justify specific technical solutions when developing technological processes, choosing technical means and technologies aimed at minimizing energy losses and anthropogenic impact on the environment.														
11	Module of final certification	ChD		Pre degree or Industrial Practice  <b>The purpose</b> of the predegree or Industrial practice is to collect materials for writing a final qualifying work, to expand the professional knowledge gained in the course of training, to form practical skills and skills for conducting independent scientific and practical work. <b>Content:</b> Technological equipment of the workshop or department, its structure, purpose and principles of operation. Selection of schemes of technological machines and equipment. Improvement and research of the design of devices. Development, design, calculation and design of equipment. Instilling skills in the repair of technological equipment, search and rational use of scientific and technical information.	10					v				v		v	v	
		ChD	EC	Writing and Defending a Thesis, a Graduate work, or Preparing and Passing a Comprehensive Exam  <b>Purpose:</b> Systematization, consolidation and expansion of theoretical knowledge and practical skills in the specialty and their application in solving specific scientific and research tasks. <b>Content:</b> To make optimal decisions in the design, construction and operation of technological machines and apparatuses. Development of modern designs of machines and apparatuses, patent and license study of design solutions. From the point of view of the specifics of the projected production	8					v				v		v	v	

				facility, to select and justify the optimal technological schemes of production and equipment, to present all the calculation and descriptive material in the calculation and explanatory note, providing it with a set of graphic documentation, highlighting new, original design solutions that give an individual character to the work performed by the graduate.															
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**5. SUMMARY TABLE ON THE VOLUME OF LOANS DISBURSED IN THE CONTEXT OF EP MODULES**

Course of Study	Semester	The number of mastered modules	The number of studied disciplines			Number of KZ credits					Total hours	Total KZ credits	The number of	
			OC	HSC	EC	Theoretical training	Physical training	Educational Practice	Industrial practice	Final examination			exam	cr.test
1	1	4	5	1	1	28	2				900	30	6	1
	2	4	3	2	2	27	2	1			900	30	4	4
2	3	5	2	3	3	28	2				900	30	6	2
	4	6	3	2	1	24	2		4		900	30	4	2
3	5	3			6	30					900	30	6	
	6	2			4	24			6		900	30	3	2
4	7	2			4	21					630	21	4	
	8	3			4	21					630	21	4	
	9	1							10	8	540	18		1
Total			13	8	25	203	8	2	20	8	7200	240	37	12



## 6. LEARNING STRATEGIES AND METHODS, MONITORING AND EVALUATION

<p><b>Learning strategies</b></p>	<p><b>Student-centered learning:</b> The student is the center of teaching/learning and an active participant in the learning and decision-making process.</p> <p><b>Practice-oriented training:</b> orientation to the development of practical skills.</p>
<p><b>Teaching methods</b></p>	<p>Conducting lectures, seminars, various types of practices:</p> <ul style="list-style-type: none"> <li>• <i>using innovative technologies:</i></li> <li>• problem-based learning;</li> <li>• case study;</li> <li>• group work;</li> <li>• discussions and dialogues, quizzes;</li> <li>• presentations;</li> <li>• lecture with analysis of specific situations;</li> <li>• lecture-visualization;</li> <li>• lecture-consultation;</li> <li>• round table;</li> <li>• situational analysis;</li> <li>• analysis of production documentation;</li> <li>• solving situational problems</li> <li>• <i>rational and creative use of information sources:</i></li> <li>• multimedia training programs;</li> <li>• electronic textbooks;</li> <li>• digital resources.</li> </ul> <p>Organization of independent work of students, individual consultations.</p>
<p><b>Monitoring and evaluation of the achievability of learning outcomes</b></p>	<p><b>Current control</b> on each topic of the discipline, control of knowledge in classroom and extracurricular classes (according to syllabus). Assessment forms:</p> <ul style="list-style-type: none"> <li>• survey in the classroom;</li> <li>• testing on the topics of the discipline;</li> <li>• control works;</li> <li>• protection of independent work;</li> <li>• discussions;</li> <li>• colloquiums;</li> <li>• essays, etc.</li> </ul> <p><b>Boundary control</b> at least twice during one academic period within the framework of one academic discipline.</p> <p>Intermediate certification is carried out in accordance with the working curriculum, academic calendar.</p> <p><b>Forms of holding:</b></p> <ul style="list-style-type: none"> <li>• exam in the form of testing;</li> <li>• oral examination;</li> <li>• written exam;</li> <li>• protection of term papers (projects);</li> <li>• protection of practice reports;</li> <li>• differentiated credit</li> </ul> <p><b>Final certification.</b></p>

## 7. EDUCATIONAL AND RESOURCE SUPPORT OF THE EP

<p><b>Information Resource Center</b></p>	<p>The structure of the Educational Information Center includes 6 subscriptions, 16 reading rooms, 2 electronic resource centers (ERC). The basis of the network infrastructure of the Educational and Information Center is 180 computers with Internet access, 110 workstations, 6 interactive whiteboards, 2 video doubles, 1 video conferencing system, 3 A-4 format scanners, JIC software - AIBS "IRBIS-64" under MS Windows (basic set of 6 modules), stand-alone server for uninterrupted operation in the IRBIS system.</p> <p>The library fund is reflected in the electronic catalog available to users on the site <a href="http://lib.ukgu.kz">http://lib.ukgu.kz</a> on-line 24 hours 7 days a week.</p> <p>Thematic databases of their own generation: "Almamater", "Proceedings of SKSU scientists", "Electronic archive" have been created. Online access from any device 24/7 via the external link <a href="http://articles.ukgu.kz/ru/ppp">http://articles.ukgu.kz/ru/ppp</a>.</p> <p>Catalogs are processed electronically. EC consists of 9 databases: "Books", "Articles", "Periodicals", "Proceedings of the teaching staff of SKSU", "Rare Books", "Electronic Fund", "SKGU in Print", "Readers" and "SKU".</p> <p>The EIC provides its users with 3 options for accessing its own electronic information resources: from the "Electronic Catalog" terminals in the catalog hall and in the EIC subdivisions; through the information network of the university for faculties and departments; remotely on the library website <a href="http://lib.ukgu.kz/">http://lib.ukgu.kz/</a>.</p> <p>Open access to international and republican resources: "SpringerLink", "Polpred", "Web of Science", "EBSCO", "Epigraph", to electronic versions of scientific journals in the public domain, "Zan", "RMEB", "Adebiet", Digital library "Aknurpress", "Smart-kitar", "Kitar.kz", etc.</p> <p>For people with special needs and disabilities, the library website has been adapted to the work of visually impaired users</p>
<p><b>Material and technical base</b></p>	<ul style="list-style-type: none"> <li>• Educational and research, scientific laboratory named after O.S.Balabekov;</li> <li>• Educational and research, scientific Laboratory of mechanical tests named after A.Ainabekov.             <ul style="list-style-type: none"> <li>• Specialized laboratories:</li> </ul> </li> <li>• Information and communication technologies;</li> <li>• Physics;</li> <li>• Engineering computer graphics;</li> <li>• Standardization, certification and metrology;</li> <li>• Educational and Research Laboratory of cutting theory;</li> <li>• Educational laboratory "Theory of machines and mechanisms";</li> <li>• Materials Science Training Laboratory;</li> <li>• Educational laboratory "Technology of mechanical engineering";</li> <li>• Training laboratory "Machine parts";</li> <li>• Educational laboratory "Materials Science and Foundry processes".             <ul style="list-style-type: none"> <li>• UNPC base</li> </ul> </li> <li>• SHF JSC "NGSK Kazstroyservice".             <ul style="list-style-type: none"> <li>• Practice bases:</li> </ul> </li> <li>• PetroKazakhstan Oil Products LLP</li> <li>• JSC "HILL Corporation</li> <li>• SHF JSC "NGSK Kazstroyservice", etc</li> </ul>

## **AGREEMENT SHEET**

On the Education program «6B07181 –«Machinery and equipment of oil and gas industry»

Director of DAA \_\_\_\_\_ Naukenova A.S

Director of DASc \_\_\_\_\_ Nazarbek U.B

Director of DEC \_\_\_\_\_ Bazhirov T.S