MINISTRY OF SCIENCES AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN

M.Auezov SOUTH KAZAKHSTAN UNIVERSITY

«APPROVED BY»
Chairman of the
board-Rector
Doctor of historical Sciences,
Academician, Kozhamzharova D.P.
«___»_____20___ y.

EDUCATION PROGRAMME

6B07180 - Technological machine and equipment (on branch)

Registration number	6B07100018
Code and classification of the field of education	6B07-Engineering, Manufacturing and Civil engineering
Code and classification of training areas	6B071- Engineering and engineering trades
Group of educational programs	B064- Mechanics and metal working
Type of EP	acting
ISCE level	6
NQF level	6
SQF of education level	6
Language of learning	Kazakh, Russian, English
The complexity of the EP, not less	240 credits
Distinctive features of EP	-
University Partner (JEP)	-
University Partner (TDEP)	-

Shymkent, 2023

Developers:

Full name	Position	Signature
Seithanov N.T.	c.tc.s., associate professor, head of the department «Technological machines and equipment»	
Volnenko A.A.	d.t.s, professor of the department «Technological machines and equipment»	
KorganbayevB. N.	d.t.s, professor of the department «Technological machines and equipment»	
Dosmakanbetova A.A.	c.tc.s., associate professor of the Department «Technological machines and equipment»	
Seithanov N.T.	c.tc.s., associate professor of the Department «Technological machines and equipment»	
Pazilova G.D.	Senior lecturer of the department «Technological machines and equipment»	
SeitkasimovaL.A.	Senior lecturer of the department «Technological machines and equipment»	
Turan S.S.	studentgroup MMG-21-3к	
Hairov A.N.	Director of JSC OGCC«KazStroyService»	
Asilov A.A.	Director of the LLP «Kazmukhinproekt»	
Kudabaev B.K	Director of the LLP «Ferrum-Vtor»	
SihimbaevZh.B	Director of JSC «Kardanvab»	
Nurdin A.N.	Director of the LLP «ShymkentTemir»	

The EP was considered in the direction of training "Engineering and Science in Engineering", at a meeting of the academic committee, Minutes № 6 «14» 02 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

Minutes № 13 from «23» 02 2023.

CONTENT

1. CONCEPT OF THE PROGRAM

Mission ofthe University	We are focused on generating new competencies, training a leader who translates thinking and culture
UniversityValues	• Openness–open to change, innovation and cooperation. • Creativity – generates ideas, develops them and turns them into values. • Academic freedom – free to choose, develop and act. • Partnership – creates trust and support in a relationship where everyone wins. • Social responsibility – ready to fulfill obligations, make decisions and be responsible for their results.
Graduate Model	• Deep subject knowledge, their application and continuous expansion in professional activity. • Information and digital literacy and mobility in rapidly changing conditions. • Research skills, creativity and emotional intelligence. • Entrepreneurship, independence and responsibility for their activities and well-being. • Global and national citizenship, tolerance to cultures and languages.
The uniqueness of the educational program	It is aimed at training a practice-oriented highly qualified Bachelor of Engineering and Technology, capable of rationally using scientific and engineering knowledge in the field of chemical industry.
Academic integrity and ethics policy	In universities, measures are enforced to maintain academic integrity and academic freedom, protecting against the loving view of intolerance and discrimination: • Rules of academic integrity (Minutes of the Academic Council №3 dated 30.10.2018); • Anti-Corruption Standard (review No. 373 n/A dated 12/27/2019). • Code of Ethics (Protocol №8 of 31.01.2020).
Regulatory and legal framework for the development of EP	1. Law of the Republic of Kazakhstan "On Education"; 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 with amendments and additions dated December 29, 2021 No. 614 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; 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 №152; 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 №553. 6. Guidelines for the use of ECTS. 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.
Organization of the	• Implementation of the principles of the Bologna Process

educational process	• Student-centered learning • Availability • Inclusivity
Quality assurance of the Educational program	• Internal quality assurance system • Involvement of stakeholders in the development of the OP and its evaluation • Systematic monitoring • Updating the content (updating)
Requirements for applicants	They are established according to the Standard Rules for 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 №600 dated 31.10.2018
Conditions for the implementation of educational programs (EP) for persons with disabilities and special educational needs(SSN)	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 http://lib.ukgu.kz/ is open 24/7. An individual differentiated approach is provided for all types of classes and in the organization of the educational process.

2. PASSPORT of the Educational program

Purpose of the EP	Raining competitive bachelor of organizational, managerial, informational, analytical, entrepreneurial, and research activities in the design and maintenance of technological machines and equipment
Tasks of the EP	• the formation of socially responsible behavior in society, an understanding of the significance of professional ethical norms and adherence to these norms; • providing basic undergraduate training that allows you to continue learning throughout life, to successfully adapt to changing conditions throughout their professional careers; • ensuring the conditions for acquiring a high general intellectual level of development, mastering literate and developed speech, a culture of thinking and the skills of scientific organization of labor in the field of chemical production; • creation of conditions for intellectual, physical, spiritual, aesthetic development to ensure the possibility of their employment or continuing education at subsequent levels of education.
Harmonization of EP	• 6th level of the National Qualifications Framework of the Republic of Kazakhstan; • Dublin descriptors of the 6th level of qualification; • 1 cycle of the Qualification Framework of the European Higher Education Area (the Qualifications System of the European Higher Education Area); • Level 6 of the European Qualification Framework for Lifelong Learning (the European Qualification System for Lifelong Learning).
Connection of EP with the professional sphere	• Professional standard. Repair of technological equipment-NCE RK "Atameken", 30.12.2019 №269; • Professional standard. The trials of the NCE RK "Atameken", 30.12.2019, №269; • Professional standard. "Operation and repair of technological equipment" of NCE RK "Atameken", 7.12. 2019 №266; • ORC "Chemical industry". Industry Commission on social partnership and regulation of social and labor relations for the mining, chemical, construction and woodworking industries, light industry and mechanical engineering dated August 16, 2016 №1. • Professional standard. Ensuring the reliability and mechanical integrity of the equipment. NCE RK "Atameken", dated 06.12.2022, No. 224. • Professional standard. Equipment maintenance and repair management. NCE RK "Atameken", dated 06.12.2022, No. 224.
Name of the degree awarded	After the successful completion of this EP, the graduate is awarded "Bachelor of Engineering and Technology in the educational program 6B07180-Technological machines and equipment (on branch)"
List of qualifications and positions	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; site master; engineer; design engineer; commissioning engineer and testing; repair engineer; mechanic; a design engineer (in research institutions, design and 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 Order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated December 30, 2020 No. 553
Field of professional activity	The field of science, technology, a diversified manufacturing sector covering the development, design, manufacture, commissioning, operation, repair and improvement of the design and operating modes of automated lines, aggregates, machines and devices intended for the production of various materials in the chemical industry, industrial complex, design and research organizations.
Objects of professional activity	Organizations, enterprises of the military-industrial complex, government bodies of management, design and research organizations, engineering enterprises, research institutes specializing in the design of process equipment, companies and firms of various forms of ownership.
Subjects of professional activity	Power equipment; running equipment; drive systems; motion control systems; operator life support systems; construction and repair materials; equipment for manufacturing, testing and disposal of technological machines; equipment for maintenance and repair of technological machines; control and measuring devices for the production and operation of machines; equipment for automation of working processes of machines; equipment for designing machines
Types of professional activity	• settlement-design; • production- technology; • experimental -research; • organizational-managerial; • installation-setup; • ervice in the field of chemical production
Learning outcomes	**LO1** Communicate freely in the professional environment and society in Kazakh, Russian and English languages, having the skills of subject-language integrated learning, academic writing, understanding the values of the principles and culture of academic integrity **LO2** Apply natural science, mathematical, social, socio-economic, environmental, entrepreneurial and engineering knowledge in professional activities, methods of mathematical data processing, scientific and experimental researches, regulatory documents and elements of economic analysis. **LO3** To have an understanding about various market structures, by analyzing the state of the enterprise's economy, using legal norms in professional and social activities, possessing entrepreneurship skills, forming anti-corruption worldviews and zero tolerance for any corruption manifestations and applying social knowledge **LO4** To ensure the mechanical integrity, reliability of technological equipment and its operation based on the principles of construction of machines and mechanisms, parts and their design, calculations for the strength and rigidity of structural systems **LO5** Apply kinematic schemes of machines, make calculation schemes, design mechanical gears, choose structural materials for machine parts, by using the basic laws and methods of mechanics to solving specific applied tasks. **LO6** Apply the basic methods of manufacturing and assembly techniques of products, as well as welding structures, by making a choice

	of welding equipment, fixtures and tools. **LO7** Participate in the calculation and design of parts and components of machine-building structures in accordance with technical tasks, by performing work on standardization, technical preparation for certification of technical means, systems, processes, equipment and materials **LO8** To choose and calculate the main and auxiliary equipment taking into account the solution of energy and resource saving tasks, as well as environmental protection from man-made impacts of production **LO9** Choose equipment for storage facilities and the fulfillment of lifting and transport operations by using complex mechanization and automation. **LO10** To organize and control the fulfillment of the main types of routine maintenance work on the operation, installation, maintenance and repair of machinery and equipment, to test machines and their elements for reliability according to standard methods by introducing the results of research and development **LO11** Conduct a reasonable choice of technological equipment for carrying out hydromechanical, mechanical and heat and mass transfer processes, hydropneumatic machines and drives by carrying out its calculation and determining the optimal technological parameters of the process. **LO12** To make calculations and carry out preliminary design of technological equipment by analyzing the principles of construction of technological schemes **LO13** To work effectively individually and as a team member, to defend your point of view correctly by correcting own actions and using various methods, expanding the horizons of competencies studied in the framework of the additional program "Minor".

3. COMPETENCIES OF A GRADUATE OF THE EP

GENERAL COMPETENCIES (SOFTSKILLS). Behavioral skills and personal qualities	
GC 1. Competence in managing one's literacy	GC 1.1. The ability to self-study, self-develop and constantly uChDate 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 spheres 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 of the traditions and culture of other peoples of the world, to possess high spiritual qualities.
PROFESSIONAL COMPETENCIES(HARDSKILLS).	
Theoretical knowledge and practical skills specific to this field	PC1 the ability to organize metrological assurance of technological processes, use standard methods of quality control of products
	PC2 the ability to develop technical specifications for the design and manufacture of machines, drives, systems and non-standard equipment and technological equipment, to choose equipment and machine-tool attachments
	PC3 the ability to be responsible for the production of finished

	products: the manufacture, assembly and preliminary testing of machinery and equipment for the preparation, prevention of the means of production of machinery and equipment, for the planning and development of business processes that can lead to significant changes or development
	PC4 the ability to compile technical documentation (schedules, instructions, plans, estimates, applications for materials, equipment, etc.), as well as perform the installation reports on the approved forms
	PC5 the ability to conduct measurements and observations, to make descriptions of the research, to prepare data for the preparation of surveys, reports and scientific publications

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 ON LABOR INTENSITY

№	Module nam	CYCLE	ВК/КВ	Component N	Brief course description (in 30-50 word)	Number of credits	Generated learning outcomes (codes)												
							LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
1	Module of the social science	GED	OC	History of Kazakhstan	**The purpose** of the discipline isformation 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. **Content:** 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.	5		**v**	**v**									
		GED	OC	Philosophy	**Purpose:** 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.	5		**v**	**v**									

					Content: Emergence of a culture of thinking. 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													
2	Module of socio-political knowledge	GED	OC	Social and Political Studies	**Purpose:** The goal of forming knowledge about social and political activities, explaining social and political processes and phenomena. **Content:** 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	4		v				v							

					situation in the modern world. Analysis and classification of the main political institutions.														
		GED	OC	Cultural Studies and Psychology	**Purpose:** the formation of scientific knowledge of history, modern trends, current problems and methods for the development of culture and psychology, the skills of a systematicanalysis of psychological phenomena. **Content:** 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.	4		v	**v**										
3	Socio-ethnic developme nt module	GED	HSC	Ecosystem and Law	**Purpose:** Formation of integrated knowledge in the field of economics, law, anti-corruption culture, ecology and life safety, entrepreneurship, scientific research methods. **Content:** Fundamentals of safe human-nature interaction, ecosystem and biosphere productivity. The entrepreneurial activity of society in conditions of limited resources, increasing	5		**v**	**v**					**v**					

					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, state regulation of public relations to ensure social progress. Application of scientific research methods.														
		BD	EC	Mukhtar Study	**Purpose:** 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. **Content:** 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 "Korgansyzdyn 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".	3	v	v												
		BD	EC	Actual Problems and Modernization of Public Consciousness	**The purpose** 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. **Content:** Spiritual modernization: origin and background. Modern national		v	v											

					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 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	Abay Study	**Purpose:** Based on the creativity of A.Kunanbayev, the preservation of the «national code» and in the project «Kazakhtanu» **Content:** 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.		v	v											

		BD	EC	Service to the community	**Purpose:** 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. **Content:** The concept and meaning of Service learning, the history of the formation and development of the concept of Service 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.		v		v										
		BD	EC	Foundations of Anticorruption Culture	**Purpose:** Formation of an anti-corruption worldview, strong moral foundations of a personality, civic position, stable skills of anti-corruption behavior. **Content:** 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,		v		v										

					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.														
4	Communication and Physical Education module	GED	OC	Kazakh (Russian) language	**Purpose:** formation of communicative competence using the Kazakh (Russian) language in the socio-cultural, professional and public life, improvement of the ability to write academic texts. **Content**: 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.	10	v	v												
		GED	OC	Foreign Language	**Purpose:** 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	10	v	v												

					common European competence. **Content**: 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 educational program, knowledge of terminology and critical thinking development.														
		GED	OC	Physical Training	**Purpose:** 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. **Content**: 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	8		v												v

					Bubnovsky.														
		BD	HSC	Professional Kazakh (Russian) Language	**Purpose:** 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. **Content:** 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 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.	3	v	v												
		BD	HSC	Professionally Oriented Foreign Language	**Purpose:** To train the future specialist in speech skills in the professional language, ethics of professional language communication. **Content:** 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.	3	v											v		
		GED	OC	Information a Communicati	**Purpose:** formation of the ability to critically evaluate and analyze processes,	5	v	v												

				Technologies (in English)	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 **Content:** Introduction and architecture of computer systems. Software. Operating systems. Human-computer interaction. Database systems. Data analysis. Data management. Networks and Telecommunications.Cybersecurity. Internet technologies. Cloud and Mobile technologies. Multimedia technologies. Smart technology. E-technologies. Electronic business. Electronic government.														
5	Fundamentals of Engineering and Technical Sciences	BD	HSC	Higher Mathematics	**Purpose:** To perform the necessary measurements and related calculations, apply theorems, formulas and mathematical methods to solve professional problems. **Content:** 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.	5		v		v								v	

					Multivariable function. Differential equations of the first and second orders. Series.														
		BD	HSC	Physics	Purpose: 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. **Content:** 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, methods for processing and analyzing the results of theoretical and experimental research.	6		v		v									
		BD	HSC	Fundamentals Design and Machines' Components	**Purpose:** Formation of complex of knowledge, skills, research skills in field of analysis, calculations of machine parts, assemblies, design of machinery and equipment in industry. **Content:** Classification and basic requirements for machine parts and assemblies. Principles and methods of design, stages of development. Design, verification calculations. Multivariance, 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.	5				v	**v**	v	v					

					Body parts. Connections. Detachable and non-removable connections.														
		BD	HSC	Engineering Computer Graphics	**Purpose:** Formation knowledge, skills and abilities sufficient to compile engineering and design documentation using AutoCAD. **Content:** 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. Building a three-dimensional model of an object.	4		v					v						
		BD	EC	Technology of Construction al Materials	**Purpose:** 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.**Content:** 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	4				v	**v**								

					electrochemical processing methods. Technology for the production of blanks and machine parts from non-metallic materials.														
		BD	EC	Materials Science	**Purpose:** 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. **Content**: 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 steels. Steels and alloys for special purposes. Non-ferrous metals and alloys. Basic non-metallic materials and composites.					v	**v**								
		BD	EC	Theoretical Mechanics and Strength of Materials	**Purpose:** Master general laws, methods of theoretical mechanics, materials resistance; form skills of using theoretical provisions of discipline in solving professional problems. **Content:** 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	5				v	**v**								

					resistance are axial tension-compression, transverse bending, shear, torsion, complex types of deformations, stress-strain state, fatigue failure, stability of systems.														
		BD	EC	Analytical mechanics	**Purpose:** Formation of knowledge in field of studying laws of mechanical phenomena related processes taking place in machines, devices, structures, elements by analytical mechanics methods. **Content:** 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 mathematical modeling of machines, apparatuses, objects, supporting elements.					v	**v**								
		BD	EC	Theory of Mechanisms and Machines	**Purpose:** 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. **Content:** Main elements of block diagram. Kinematic pairs, chains, their classification. Main types of mechanisms. Formation principle of lever mechanisms.	4				v	**v**	v							

					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.														
		BD	EC	Mechanics of Machines	**Purpose:** 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. **Content:** 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 links. Industrial robots structure, kinematics, dynamics.					v	**v**								
		BD	HSC	Standartizatio Certification Metrology	**Purpose:** 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 **Content:** Objects of standardization, certification and metrology. Legislative and regulatory framework for	4		v					v						

					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.														
6	Service and exploitation of machines	ChD	EC	Assembly and Operation of Technological Machines	**Purpose:** 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. **Content:** 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 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.	5									v	v			v
		ChD	EC	Sequence of	**Purpose:** Take theoretical bases and gain										v	v			v

				installation works and preparation for operation of technological machinest	practical skills in the selection, calculation and development of technology for processing machines and devices in the chemical industry **Content:** 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.													
		BD		Training Practice	**Purpose:** To consolidate and deepen students' theoretical knowledge, to gain practical skills and competencies, as well as experience in independent professional activity. **Content:** Study of the basics of professional 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	1					**v**	v							

					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	**Purpose:** To study and master methods and means of organization and carrying out diagnostics and repair of technological machines in the production process control system. **Content:** 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.	5						v				v			v
		ChD	EC	Restoration of Technical Resource of Technological Machines	**Purpose:** Formation of knowledge, skills and abilities in the field of restoration of the technical resource of technological machines. **Content:** Maintenance of technological machines and equipment. Methods and 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							v				v			v

					methods of restoring parts. Restoration and repair of threaded surfaces. Registration of technological documentation for the restoration of parts.														
		BD	EC	Welding Business	**Purpose:** To possess theoretical and practical knowledge of welding equipment structures, study methods of welding permanent joints. **Content:** 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.	4				v		v							v
		BD	EC	Gas Welding	**Purpose:** To study the theoretical foundations and practical application of gas welding in industry. **Content:** Gas welding technique and technology. Methods of gas welding. Materials 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.					v		v							v

					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	Introduction t Speciality and Fundamentals Chemical Engineering	**Purpose:** To provide the student in accordance with the characteristics of the university, to give a basic idea of the current state of the scientific and technical base and development of the chemical industry. **Content:** Education system of the Republic of Kazakhstan. Classification of technological machines and equipment according to the main types of industry. Basic processes of industrial technology. General concepts. The main equipment of the chemical industry, calculation methods and design features. Technological machines and equipment in the development of the national economy, the role and place of the educational program.	3		v										v		
		BD	EC	Fundamental s of Acadimic Writing	**Purpose:** To form knowledge about the main tasks and principles of academic writing and apply them in their professional activities. **Content:** Academic literacy and its importance for professional activity. The main objectives and principles of academic writing. Basic elements and units of academic text. Writing academic and scientific texts. Types of scientific texts: scientific article, scientific report, abstract, abstract, review; grant application. Work on various elements of		v	v											

					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	**Purpose:** Formation of knowledge of energy and resource saving, as well as rational use, organization and optimization, about the main recommendations and activities. **Content:** 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.	4								**v**				v	
		BD	EC	Optimization of Technological Schemes Based on Process Integration	**Purpose:** Mastering the methods of multicriteria optimization of energy and resource saving, technological processes. **Content:** Regulatory and methodological support of energy saving. Strategy for organizing and optimizing energy saving. Theoretical foundations for building intelligent systems for organizing and									**v**				v	

					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	**Purpose:** To study the hydro-mechanical and mechanical equipment of industry for its subsequent selection, calculation, design and operation. **Content:** 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.	6												v	v	
		BD	EC	Machines for grinding and separation of solid materials	**Purpose:** To study equipment for grinding and sorting of solid materials for its subsequent selection, calculation, design and operation. **Content:** Grinding processes. Physical and mechanical properties of materials. Classification of machines for grinding													v	v	

					and separating materials. Machines for crushing 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	**Purpose:** 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. **Content:** 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.	6					**v**						v		
		BD	EC	Equipment for carrying out the process of granulation	**Purpose:** Formation of ideas and skills about the processes of granulation and separation of materials, material and thermal balances of granulation and separation processes. **Content:** Theoretical foundations of the						v						v		

					process of granulation of materials. Basic parameters of wet gas. Material and heat balances of the granulation process. General 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	**Purpose:** 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. **Content:** 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.	4							v				v		
		ChD	EC	Pumps, Fans and Compressor Units	**Purpose:** To study the schematic diagrams, operational characteristics and designs of pumps, fans and compressor units.								v				v		

					Content: 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 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	**Purpose:** Formation of knowledge about the basics of technological processes, equipment and technical means designed to protect the environment. **Content:** 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.	4		v						**v**					
		BD	EC	Principles of Waste-free Industrial Production	**Purpose:** Formation of knowledge and skills necessary to create modern waste-free and low-waste technologies. **Content:** 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			v						**v**					

					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.														
		BD	EC	Technology of Apparatus Construction	**Purpose:** Formation of competencies to create optimal technological processes for the preparation of devices that meet the requirements of high performance at low cost and provide high performance. **Content:** 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.	4						v					v		
		BD	EC	Fundamentals of Designing of Technological Devices	**Purpose:** Apply knowledge to make optimal, technically competent decisions that meet specific situations that arise in the process of creating industrial equipment. **Content:** 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							v					v		

					legal acts for the design of devices. General technical requirements for the assembly and design of devices in industrial production.														
		ChD	EC	Fundamentals of Scientific-Research and Educational-Research Work of Students	**Purpose:** To develop students' research skills, to introduce students to scientific knowledge, their readiness and ability to conduct research. **Content:** Scientific research as a kind of creative activity. Information and 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.	4		v								v			
		ChD	EC	Fundamentals of patenting	**Purpose:** 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. **Content:** 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.			v								v			

		ChD		Practical Training for Students I	**Purpose:** 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. **Content:** The main types and designs, physico-chemical processes occurring in the elements of technological equipment. Study of the organization of repair and mechanical 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.	4					**v**					v			
9	Fundamentals of calculation, design and manufacture of machinery and apparatus	BD	EC	Calculation and Design of Machines and Apparatuses of Chemical Productions	**Objective:** To consolidate and expand the theoretical knowledge acquired by students in the study of disciplines, as well as to develop their practical skills in performing strength calculations of chemical production equipment in accordance with current regulatory documents and modern calculation methods. **Contents:** General principles and methodology of designing machines and apparatuses. Thin-walled vessels and apparatuses. Elements of devices loaded with internal pressure. Elements of devices loaded with external pressure..Shell conjugation nodes. Strengthening the holes in the shells. Flanged connections of the devices.Thick-walled vessels and	5				v	**v**		v						

	of chemical industry				apparatuses. Machines and apparatuses with rotating elements														
		BD	EC	Calculation of Apparatuses of Chemical Productions on the Strength	**Purpose**: Students gain knowledge, skills and abilities in the field of design and strength calculations of technological equipment of chemical and technological processes. **Content**: Materials used for the manufacture of equipment in the industry, taking into account working conditions. Classification of equipment and equipment used at the enterprises of the industry. The main provisions of the rules for the calculation and arrangement of equipment in the industry. Testing of devices. Selection of permissible voltages. Theories of strength. Calculation of thin-walled apparatus housings loaded with excessive internal and external pressure. Calculation of bottoms and flat covers. Calculation of devices for the effect of wind loads.					v	**v**		v						
		BD	EC	Processes and Devices of Chemical Technology	**Purpose:** Systematization of knowledge on the basics of technological processes of chemical production, development of skills and calculation skills of chemical devices, development of students' ability to independently search, analyze and assimilate knowledge about chemical and technological processes. **Content:** Theoretical foundations of chemical technology processes. The law of thermodynamic equilibrium. Classification of the main processes of chemical technology. General principles of analysis	6								**v**			v		

					and calculation of processes and devices. Material balances. Heat balances. Hydraulic processes. Hydro-mechanical processes. Processes of separation of heterogeneous systems. Mass-heat exchange processes. Equipment for chemical processes.														
		BD	EC	Devices for Carrying out the Basic Technological Processes	**Purpose:** To study with the main processes and apparatuses of chemical technology. **Content:** The current state of the chemical industry. Classification of the main chemical and technological processes. General principles of calculation of chemical apparatuses and machines: statics of processes (equilibrium laws), material and thermal balances, kinetic parameters, basic dimensions of apparatuses. Devices for carrying out basic technological processes, the device and the principle of operation of machines and devices used in chemical production.									**v**			v		
		ChD	EC	Reliability of technological machines in the chemical industry	**Purpose:** Knowledge of the basics of reliability of technological machines, methods of theoretical and practical use of knowledge. **Contents:** Methods and means of diagnosing technological machines of Chemical Industries.The importance of the reliability problem for modern machines. Systematic elements of diagnostic research. Basic theory of machine reliability. Conditions for standardization of reliability. Conditions for the implementation of a typical	4				v						v			

					chemical and technological process. Incompatible technological process. Typical technology. Types of technological schemes and stages of chemical production. Components of the reliability of equipment design activities. Problems. Their types. Typical technological process.Basic flowchart of a typical process structure														
		ChD	EC	Operational Reliability and Durability of Technological Equipment	**Purpose:** Be able to use the acquired knowledge to build mathematical models of processes and phenomena **Content:** Basic concepts and terms of the theory of reliability. Reliability conditions. Assessment of loads affecting the machine. Types of technological schemes. Their description. Reliable design of the technological device. Organization of operation and maintenance of equipment. General scheme for calculating the machine for reliability. Reliability of devices with a reserve					v						v			
		ChD	EC	Fundamentals Design of Chemical Plants	**Purpose:** Formation of knowledge and practical skills in the design of industrial installations of the chemical industry. **Content:** Fundamentals of design and operation of technological equipment. Classification and calculation of technological equipment. Types of design documents. Selection and development of the technological scheme of production. Placement of technological equipment. Preliminary design development of basic chemical equipment. Design of installations	5				v							v		

					in open areas. Graphical representation of a chemical plant. Requirements for the design of the graphic part of the project. Structural calculation and selection of materials in the design of the device.														
		ChD	EC	Design of Main and Mechanical Shops of Chemical Industry	**Purpose:** To form the competence of the student in the field of designing enterprises and equipment of the chemical industry. **Content:** The main stages and organization of the design of chemical production. Development of project documentation for environmental protection. Design and estimate documentation. Selection and calculations of the main and auxiliary equipment of chemical plants, its placement in industrial buildings and outdoor areas. Design of a machine shop. Layout of equipment and workplaces on the site of the machine shop.					v							v		
		BD	EC	Loading-and-Unloading Machines and Storage Equipment	**Purpose:** To study the designs, principles of operation, technical characteristics, the basics of calculating loading and unloading machines and the requirements imposed on them. **Content:** Types and classification, equipment of transport and warehouse complexes. Organization of loading and unloading operations. Lifting machines. Loading and unloading machines. Transporting machines. Cargo handling devices. Device, types, main parameters of belt, bucket, scraper, screw conveyors. Installations of pneumatic transport. Cranes. Calculation of lifting devices. Calculation of performance, drive power	5									v			v		

					and selection of the traction body.														
		BD	EC	Equipment for the Movement of Goods	**Purpose:** To form a system of professional knowledge, skills and abilities about transport and warehouse complexes used for storage and transportation of various types of cargo. **Content:** Lifting devices for lifting cargo. Purpose and classification of lifting and transport installations. The main types of lifting machines. Cargo handling devices. Continuous machines with a traction element. Fundamentals of calculation of lifting devices. Safety precautions										v			v	
		BD	EC	Technology of Mechanical Engineering of Chemical Industry	**Purpose:** formation of students' theoretical knowledge and practical skills in the field of mechanical engineering technology. **Content:** Technological preparation of production. Precision machining. Bases and basing in mechanical engineering. The quality of the surface layer of the parts. Calculation of allowances. Design of technological processes of mechanical processing and assembly. Manufacturing of shaft class parts. Manufacture of bushing and disc class parts. Manufacture of body parts. Manufacture of gears.	6				v		v							
		BD	EC	Engineering Fundamentals of Mechanical Engineering in the Chemical Industry	**Purpose:** Study of methods for developing technological processes of machine Assembly and design of typical technological processes for manufacturing blanks, parts, Assembly of assemblies and machines. **Content:** Knowledge of designing technologies for manufacturing and assembling products in the conditions of					v		v							

					modern machine-building production. The concept of the influence of mechanical processing on the metal condition of the surface layers of workpieces and the operational properties of machine parts, processing allowances, ways to increase productivity and efficiency of technological processes, as well as the theory of the fundamentals of design and technological bases.														
		ChD	EC	Engineering Fundamentals of Designing Chemical Industry Machines	**Purpose:** To familiarize students with the system of indicators that determine the quality of machines, requirements for technical facilities and signs of technology development **Contents:** Requirements for machines. 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	4						v	v						
		ChD	EC	Design Organization of Creation of Chemical Industry Machines	**Purpose:** Familiarization of students with the system of indicators that determine the quality of competitive machines in accordance with modern requirements **Contents:** Achievements, features and history of the origin of Mechanical							v	v						

					Engineering Industries. 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.														
		ChD	EC	Heat and Mass Transfer Equipment of Chemical Industry	**Purpose:** Formation of students' knowledge, skills and abilities in the field of chemical production machines and apparatuses; study of structures, working conditions and calculation methods of the main equipment of chemical production. **Content:** Main types and classification of heat and mass transfer equipment. The main types of heat carriers. Regenerative heat exchangers. Regenerative heat exchangers and installations. Evaporation and crystallization plants. Types and methods of calculation of heat exchange equipment. Sorption plants. Drying plants. Distillation and rectification plants. Types and methods of calculation of mass transfer equipment.	6											v	v	
		ChD	EC	Equipment of Exchange and Sorption Processes of Chemical Industry	**Purpose:** Formation of a complex of knowledge on the development and design of equipment for exchange-sorption processes in the chemical industry. **Content:** Basic laws of sorption processes. The use of sorbents in chemical technology. The main equipment of exchange-sorption processes of the												v	v	

					chemical industry, as well as methods of their calculation; designs, working conditions and methods of selection of the main equipment of chemical industries, taking into account the processes occurring in the apparatus.															
		ChD	EC	Technological Equipment of Chemical Industry	**Purpose:** Formation of theoretical knowledge, practical skills and methodological foundations for the development and operation of technological equipment of the chemical industry. **Contents:** The state and prospects of the industry development. Calculation and selection of technological equipment. Production and main equipment of sulfuric acid. Technological equipment for the production of ammonia and nitric acid. Production of phosphoric acids. Equipment for the production of thermal and extraction phosphoric acid. Equipment of the department of thermal preparation of raw materials. Production of phosphorus and its compounds. Equipment for the production of superphosphate, double superphosphate and ammophos. Production of sodium tripolyphosphate. Equipment for the production of nitrophosphates.	7												v	v	
		ChD	EC	Special-purpose Equipment in the Chemical Industry	**Purpose:** To study the theory, design and operation of chemical devices, special equipment in the chemical industry. **Contents:** Specialized technological equipment of the chemical industry: industry equipment for receiving and storing raw materials, semi-finished products and finished products; equipment													v	v	

					for mechanical processing of materials; industry equipment for thermal processing of materials; equipment for filtration, separation of liquids and gas purification; mixing equipment; equipment for dosing and classification of materials; equipment for chemical processes.														
		ChD		Practical Training for Students II	**Purpose:** Familiarization with the peculiarities of the functioning of a particular enterprise; systematization, consolidation and expansion of theoretical knowledge for solving production tasks. **Content:** 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.	6								**v**		v	v		
10	Module acquisition of new professional competencies	BD	EC	Subjects on the Addition Educational Program	**Purpose:** Development of additional professional competencies for effective engineering activities at food -processing enterprises. **Content:** Participate in the development of production and technological, service and operational division, to carry out technological and design-strength calculations, justify their choice for the specified conditions and production volumes. Be able to organize and control	12										v			v

					the performance of the main types of routine operations for the operation, maintenance and repair of machines and equipment in accordance with the requirements of technological processes														
11	Module of final certification	ChD		Pre degree or Industrial Practice	**The purpose** 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. **Content:** 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	
		ChD	EC	Writing and Defending aThesis, a Graduate work, or Preparing and Passing a Comprehensive Exam	**Purpose:** Systematization, consolidation and expansion of theoretical knowledge and practical skills in the specialty and their application in solving specific scientific and research tasks. **Content:** 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	8				v							v	v	v	

					projected production 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.														

5. SUMMARY TABLE ON THE VOLUME OF LOANS DISBURSED BY MODULES OF THE EDUCATIONAL PROGRAM

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
итого			13	8	25	203	8	2	20	8	7200	240	37	12

6. LEARNING STRATEGIES AND METHODS, MONITORING AND EVALUATION

Learning strategies	**Student–centered learning:** The student is the center of teaching/learning and an active participant in the learning and decision-making process. **Practice-oriented training:** orientation to the development of practical skills.
Teachingmethods	Conducting lectures, seminars, various types of practices: • *using innovative technologies:* • problem-based learning; • case study; • group work; • discussions and dialogues, quizzes; • presentations; • lecture with analysis of specific situations; • lecture-visualization; • lecture-consultation; • round table; • situational analysis; • analysis of production documentation; • solving situational problems • *rational and creative use of information sources:* • multimedia training programs; • electronic textbooks; • digital resources. Organization of independent work of students, individual consultations.
Monitoring and evaluation of the achievability of learning outcomes	**Current control** on each topic of the discipline, control of knowledge in classroom and extracurricular classes (according to syllabus). Assessment forms: • survey in the classroom; • testing on the topics of the discipline; • control works; • protection of independent work; • discussions; • colloquiums; • essays, etc. **Boundary control** at least twice during one academic period within the framework of one academic discipline. Intermediate certification is carried out in accordance with the working curriculum, academic calendar. **Forms of holding:** • exam in the form of testing; • oral examination; • written exam; • protection of term papers (projects); • protection of practice reports; • differentiated credit **Final certification.**

7. EDUCATIONAL AND RESOURCE SUPPORT OF THE EP

Information Resource Center	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. The library fund is reflected in the electronic catalog available to users on the site http://lib.ukgu.kz on-line 24 hours 7 days a week. 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 http://articles.ukgu.kz/ru/pps. 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". 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 http://lib.ukgu.kz/. 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. For people with special needs and disabilities, the library website has been adapted to the work of visually impaired users
Material and technical base	• Educational and research, scientific laboratory named after O.S.Balabekov; • Educational and research, scientific Laboratory of mechanical tests named after A.Ainabekov. **Specializedlaboratories:** • Informationandcommunicationtechnologies; • Physics; • Engineeringcomputergraphics; • Standardization, certificationandmetrology; • Educational and Research Laboratory of cutting theory; • Educational laboratory "Theory of machines and mechanisms"; • Materials Science Training Laboratory; • Educational laboratory "Technology of mechanical engineering"; • Training laboratory "Machine parts"; • Educational laboratory "Materials Science and Foundry processes". **UNPC base** • SHF JSC "NGSK Kazstroyservice". **Practicebases:** • JSC "Cardanval" • LLP «RPhS» • SHF JSC "NGSK Kazstroyservice" and so on.

AGREEMENT SHEET

By Education Program code 6B07180 –« Technological machine and equipment (on branch)»

Director of DAA _____ Naukenova A.S.

Director of DASc _____ Nazarbek U.B.

Director of DE&C _____ Bazhirov T.S.