

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF
KAZAKHSTAN
M.Auezov SOUTH KAZAKHSTAN UNIVERSITY

« APPROVED BY»

Chairman of the Board – Rector
d.h.s., academician Kozhamzharova D.P.



EDUCATION PROGRAMME

6B07124 – «Electro technical machinery and energy systems engineering»

Registration number	6B07100010
Code and classification of the field of education	6B07 Engineering, Processing and construction branches
Code and classification of training areas	6B071 Engineering and Engineering business
Group of educational programs	B064 – Mechanics and Metalworking
Type of EP	Current
ISCE level	6
NQF level	6
SQF of education level	6, Mechanical engineering
Language of learning	Kazakh, Russian
Typical duration of study	4 years
The complexity of the EP, not less	240 credits
Distinctive features of EP	-
University Partner (JEP)	-
University Partner (TDEP)	-

Shymkent, 2023

Drafters:

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Education Programme was considered by the AC of «Engineering and Engineering business», Protocol № 6 from «14» 02 2023 y.

Chairman of AC Aitureev M.Zh.
sign

Considered and recommended for approval at the meeting of Educational and Methodical Council of M. Auezov SKU, protocol № 4 from «22» 02 2023 y.

Chairman of the EMS Abisheva R.Zh.
sign

Approved by the decision of the Academic Council of the University, protocol № 13 from «23» 02 2023.

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1 CONCEPT OF THE PROGRAM

University Mission	Generating new competencies, training of a leader who translates research thinking and culture
University Values	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • The program has been developed in accordance with the Atlas of New Professions and Competencies, for the training of specialists with conceptual knowledge in the field of technology, technology, capable of independently setting and solving tasks, using adequate methods and means to achieve them, to carry out professional, scientific and entrepreneurial activities.
Academic Integrity and Ethics Policy	<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"> • Rules of academic integrity (Minutes of the Academic Council No. 3 dated 30.10.2018); • Anti-Corruption Standard (Order No. 373 n/k dated 27.12.2019). • Code of Ethics (Protocol of the Academic Council No. 8 dated 31.01.2020).
Regulatory and legal framework for the development of EP	<ol style="list-style-type: none"> 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 October 31, 2018 No. 604; 4. Rules for organizing the educational process on credit technology of education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152; 5. 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. 6. Guidelines for the use of ECTS. 7. Guidelines for the development of educational programs for higher and postgraduate education, Appendix 1 to the order of the Director of

	the Center for the Bologna Process and Academic Mobility No. 45 o / d dated June 30, 2021
Organization of the educational process	<ul style="list-style-type: none"> • Implementation of the principles of the Bologna Process • Student-centered learning • Availability • Inclusivity
Quality assurance of the Educational program	<ul style="list-style-type: none"> • Internal quality assurance system • Involvement of stakeholders in the development of the Educational Program and its evaluation • Systematic monitoring • Actualization of the content (updating)
Requirements for applicants	It is established according to the Model 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 No. 600 dated 31.10.2018
Conditions for the implementation of EP for persons with disabilities and OOP	<p>For students with OOP and LSI, tactile PVC tiles, specially equipped toilets, a mnemonic circuit, rods in shower rooms are installed in academic buildings and student dormitories. Special parking spaces have been created. A crawler lift is installed. There are desks for MGN, signs indicating the direction of movement, ramps. The academic buildings (main building, No. 8 building) are equipped with 2 classrooms with six workstations adapted for users with disorders of the musculoskeletal system (ODE). For visually impaired users, there is a SARA TM CE machine (2 pcs.) for scanning and reading books. The library's website is adapted for the visually impaired. There is a special NVDA audio program with the service.OFIC web site http://lib.ukgu.kz / in 24/7 operation mode.</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

Purpose of the EP	Opening-up of competitive specialists with practical skills in designing production and maintenance of electrical and power machines, who are able to apply the results of the latest advanced technologies and achievements in the field of power engineering.
Tasks of the EP	<p>- Formation of worldview positions that contribute to understanding the importance of professional ethical norms and following these norms, providing conditions for mastering literate and developed speech, native and foreign languages, skills and skills of constructive dialogue, communication in a multicultural, multiethnic and multi-confessional society;</p> <p>-Formation of a highly educated personality with a broad outlook and a culture of thinking, having the ability to express reasonable logical judgments, to determine and understand the role of technology and technology, as well as the working processes of energy machines and installations, their technical capabilities and prospects for use in various spheres of human activity.</p> <p>-Providing basic bachelor's training that allows them to improve their professional knowledge throughout their life, easily adapt to changing conditions throughout their professional career;</p> <p>-Providing conditions for bachelors to acquire a high general intellectual level of development, the ability to apply modern methods of 3D modeling, design, product design, introduction of scientific labor organization into production;</p> <p>-Formation of competitiveness of graduates in the labor market who are able to solve production, technical and scientific tasks of power engineering;</p> <p>-Formation of specialists capable of developing and implementing innovative technologies, carrying out design and design activities using modeling and other special engineering programs.</p>
Harmonization of EP	<ul style="list-style-type: none"> • 6th level of the National Qualifications Framework of the Republic of Kazakhstan; • Dublin descriptor of the 6th level of qualification; • 1 cycle of a Framework for Qualification of the European Higher Education Area); • 6th Level of European Qualification Framework for Life long Learning).
Connection of the EP with the professional sphere	<p>The Industry Qualifications Framework for the "Mechanical Engineering" industry, (Approved by the minutes of the Meeting of the Industry Commissions on Social Partnership and Regulation of Social and Labor Relations for the Mining, Chemical, construction and woodworking industries, light industry and mechanical engineering dated August 16, 2016, Protocol No. 1);</p> <p>Professional standards "Mechanical Engineering and metalworking" (Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated December 30, 2019 No. 269), as well as the requirements of the labor market of relevant industries and the requirements of employers.</p>
Name of the degree awarded	After the successful completion of this EP, the graduate is awarded a bachelor's degree in "Engineering and technology" 6B07124 – "Electrical Engineering and energy systems engineering"

List of qualification sandpositions	Bachelors in 6B07124 –"Electrical Engineering and energy systems engineering" can hold the following positions: Mechanical Processing Engineer, Service Engineer, Engineer - Technologist, Installation Engineer, Commissioning and Testing Engineer, Design Engineer, Cable Production Engineer, Industrial Robot Maintenance Technician, Industrial Robotics Designer, Industrial Robot Maintenance Technician, Radio Engineer, Engineer, Mechatronicist, Optical Instrument Engineer, Cyberneticist, Chief pilot production, head of laboratories, foreman of the site, head of the welding service, head of the equipment configuration department, head of the repair shop, according to the professional standard "Mechanical Engineering and metalworking" (Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated December 30, 2019 No. 269 and 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. Engineer for the modernization of traditional energy equipment; Mechanical Engineer 2.0 according to the Atlas of New Professions and competencies in the Republic of Kazakhstan. Mechanical engineering. New professions. 2020. №6. https://www.enbek.kz/atlas/journals/industry/7
Field of professional activity	The sphere of professional activity is educational, scientific and production processes in state and non-state institutions, as well as in private companies engaged in the production of competitive energy engineering products.
Objects of professional activity	The objects of professional activity of graduates are machine-building enterprises, design, production, repair and maintenance organizations of the power engineering and energy industries, service and installation organizations operating power machines, as well as government agencies, research institutions, institutions of state and non-state profile, including industry, agriculture and utilities.
Subjects of professional activity	The subjects of the bachelor's professional activity in 6B07124 – "Electrical engineering and energy systems engineering" are the production and technological processes of machine-building enterprises, as well as enterprises working with equipment in various sectors of the economy, production and technological processes of enterprises associated with ensuring the continuous operation of production.
Types of professional activity	-design and engineering; - production and technological; - organizational and managerial; -scientific research; -service and operational; -installation and commissioning.
Learning outcomes	LO1. Freely to communicate in the professional environment and society in Kazakh, Russian and English to solve the problems of interpersonal and intercultural interaction, taking into account the principles of academic writing and the culture of academic integrity. LO2.To show natural-science, mathematical, social and economic and engineering knowledge in professional work, methods of mathematical data processing, methods theoretical and an experimental research, knowledge standard documents and elements of the economic assaying. LO3. To possess ability of generalisation, the assaying and perception of

the information and handling of experimental data, to use the information on new master schedules and new aspects of a utilities equipment in the activity.

LO4.To realize master schedules on projection and manufacture electro technical and a utilities equipment, to design new and to modernize existing power installations, to ensure the technical manual of power installations of various type.

LO5.To expand scope of application of the newest techniques and structural materials in machine industry, to reduce start periods in manufactures of new articles, to promote necessity growth in manufacture of innovative production of domestic machine industry, to change consumer preferences and to introduce, construct and steer industrial robots at the engineering operations.

LO6.To show knowledge of the theoretical fundamentals of working processes in power cars, devices and installations; to calculate elements of power cars and installations taking into account properties of structural materials, dynamic and thermal loads.

LO7.To model, construct, engineering, operate and maintain power equipment and systems

LO8. Design schemes and methods of installation and commissioning and maintenance work based on the use of methods of organization, testing and maintenance of technological processes.

LO9. To make and justify specific design decisions when creating objects of electrical and power engineering, to submit technical documentation in accordance with the requirements of the ESCD.

LO10. To plan and perform numerical experimental studies, process and analyze the results, participate in testing of power engineering equipments;

LO11.To design innovative types of electrical products based on knowledge-intensive power engineering;

LO12.Demonstrate the skills of self-education, self-education, a healthy lifestyle throughout life, teamwork, skills of registering the effectiveness of activities.

3 COMPETENCES OF THE GRADUATE OF EP

SOFTSKILLS. Behavioral skills and personality qualities	
SS 1. Competence in managing one's own literacy	SS1.1. The ability of self-learn, self-develop and constantly update their knowledge within the chosen trajectory and in an interdisciplinary environment. SS1.2. The ability to express thoughts, feelings, facts and opinions in the professional field. SS1.3. The ability for mobility in the modern world and critical thinking.
SS 2. Language competence	SS2.1. The ability to build communication programs in the state, Russian and foreign languages. SS2.2. The ability for interpersonal social and professional communication in the conditions of intercultural communication.
SS 3. Mathematical Competence and Competence in the field of Science	SS3.1. 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.
SS 4. Digital competence, technological literacy	SS4.1. 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. SS4.2. The ability to use various types of information and communication technologies: Internet resources, cloud and mobile services for searching, storing, protecting and disseminating information.
SS 5. Personal, social and academic competencies	SS5.1. The ability for physical self-improvement and focus on a healthy lifestyle to ensure full-fledged social and professional activities through the methods and means of physical culture. SS5.2. The ability to social and cultural development based on the manifestation of citizenship and morality. SS5.3. The ability to build a personal educational trajectory throughout life for self-development, career growth and professional success. SS5.4. The ability to successfully interact in a variety of socio-cultural contexts during study, work, home and leisure.
SS 6. Entrepreneurial competence	SS6.1. The ability to be creative and entrepreneurial in a variety of environments. SS6.2. The ability to work in a mode of uncertainty and rapidly changing task conditions, make decisions, allocate resources and manage your time. SS6.3. The ability to work with consumer requests
SS 7. Cultural awareness and ability to express yourself	SS7.1. The ability to show world view, civil and moral positions. SS7.2. The ability to be tolerant of the traditions and cultures of the peoples of the world, to have high spiritual qualities.
PROFESSIONAL COMPETENCIES (HARDSKILLS).	
Theoretical knowledge and practical skills specific to this field	PC-1 – ability to understand the principles of constructing images and drawings of geometric objects; rules for design documentation in accordance with ISO standards, ESKD/ESTD. Be able to perform calculations, design and graphically present information about processes and objects;
	PC-2 – to carry out engineering projects of high-tech power equipment using modern design methods to achieve optimal results

	taking into account economic and environmental constraints;
	PC-3 – the ability to use standard software tools in the design of technologies and equipment, to represent the schematic diagrams of the main and auxiliary equipment, to be ready to use the basic concepts, laws and models of thermodynamics, chemical kinetics, heat transfer and mass;
	PC-4 – plan and perform numerical experimental studies, process and analyze the results, participate in testing of power engineering facilities;
	PC-5 –ability to design technological processes for the manufacture of pumping equipment; independently choose the optimal technology for the production of competitive products.
	PC 6 – The ability to develop technological processes of mechanical processing taking into account the devices and purpose of metalworking machines, as well as to analyze the initial data (drawings, technological documents) for machining parts of medium complexity with a size accuracy of 7-10 quality.
	PC 7 – Ability to perform repair, installation, service of electrical equipment and power systems, diagnostics of the technical condition of complex components and mechanisms, maintenance of the workplace in accordance with the requirements of labor protection, fire, industrial and environmental safety, rules of workplace organization during maintenance
	PC 8 – The ability to organize and carry out the preparation of plumbing, control and measuring tools and devices for performing technological operations, as well as the preparation and testing of complex engineering products
	PC 9 – The ability to model technological processes using standard packages and automated design tools, control the quality of manufacturing test products, perform quality control of work, make necessary adjustments and methods and methods of adjustment, develop methodological, regulatory documents and technical documentation

3.1 Matrix of correlation of learning outcomes for EP as a whole with the formed competencies of modules

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11	LO12
SO1	+	+			+	+			+	+	+	+
SO2		+	+		+	+				+	+	
SO3	+	+	+					+	+		+	+
SO4		+	+	+		+	+			+	+	
SO5	+			+	+		+	+	+	+	+	
SO6		+	+		+	+	+		+			
SO7	+		+	+		+			+	+	+	+
PC1		+		+		+		+			+	+
PC2	+	+		+		+			+	+	+	+
PC3	+		+	+	+	+	+	+		+		+
PC4		+			+	+	+		+		+	
PC5	+	+		+	+	+	+	+	+	+		+
PC6	+	+		+	+	+	+	+	+	+		+
PC7	+	+		+	+	+	+	+	+	+		+
PC8	+	+		+	+	+	+	+	+	+		+
PC9	+	+		+	+	+	+	+	+	+		+

**1 MATRIX OF THE INFLUENCE OF DISCIPLINES ON THE FORMATION OF TRAINING RESULTS
AND INFORMATION ON LABOR INTENSITY**

№	Module name	Cycle	Component	Discipline name	Brief description of the discipline	number of credits	Formed learning outcomes											
							LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11	LO12
1	Module of the social science	GED	OC	History of Kazakhstan	The purpose 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. Ancient people and the formation of nomadic civilization. Turkic civilization and the great steppe. Kazakh Khanate. Kazakhstan in the era of modern times. Kazakhstan as part of the Soviet administrative-command system. Declaration of Independence of Kazakhstan. State system, socio-political development, foreign policy and international relations of the Republic of Kazakhstan. Methods and techniques of historical description for the analysis of the causes and consequences of events in the history of Kazakhstan.	5		v										
2		GED	OC	Philosophy	Purpose The formation of a holistic idea among students about	5		v										

					<p>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>Contents: 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</p>													
3	Socio-political	GED	OC	Sociology and Political	The goal of forming knowledge about social and political activities,	4		v										

	knowledge module			Science	<p>explaining social and political processes and phenomena. 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.</p> <p>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		GED	OC	Cultural studies and psychology	<p>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 systematic analysis of psychological phenomena. Contents: Morphology, language, semiotics, anatomy of culture.</p>	4		v									

					<p>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>													
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5	Module of socio-ethnic development	GED	OC	Ecosystem and Law	Formation of integrated knowledge in the field of economics, law, anti-corruption culture, ecology and life safety, entrepreneurship, scientific research methods. 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, state regulation of public relations to ensure social progress. Application of scientific research methods.	5		v										
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6		BD	EC	Mukhtar Studies	<p>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.</p> <p>The content of the discipline 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										
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7				Foundations of Anticorruption Culture	<p>Purpose: formation of an anti-corruption worldview, strong moral foundations of a personality, civic position, stable skills of anti-corruption behavior.</p> <p>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, 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>		v											
8		BD	EC	Actual Problems and Modernization of	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			v										

				Public Consciousness	modernization of the public consciousness of young people. 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 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.												
9				Service to Society	The aim is the 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			v									

					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.													
10		BD	EC	Abay Study	<p>Purpose: based on the creativity of A.Kunanbayev, the preservation of the «national code» and in the project «Kazakhtanu»</p> <p>Contents: 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</p>		v	v										

					Edification»by Abai, an epic novel by M.Auyezova «The Way of Abai» . K. Tokayev «Abai and Kazakhstan in the XXI century», role, significance.													
11	Communication and Physical Culture Module	GED	EC	Kazakh (Russian) language	<p>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.</p> <p>The contents: 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>	10	v											
12		GED	OC	Foreign language	<p>The aim is a formation of students' intercultural and communicative competence in the process of foreign language education at a</p>	10	v											

					<p>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>The contents. 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.</p>													
13		GED	OC	Physical Training	Objective: 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	8												v

					stresses and adverse factors in future work. 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.													
14		BD	EC	Professional 1 Kazakh (Russian) Language	Goal: 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 educational-	3	v											

					professional and scientific-professional spheres. Algorithm of work on the analysis and production of scientific texts on specialty. Producing scientific and professional texts. Basics of business communication and documentation within the framework of future professional activity.													
15		BD	EC	Professionally Oriented Foreign Language	<p>Purpose: Forms and develops practical skills of foreign language skills, helps to understand texts of various complexity on technical themes, to study the basic words and expressions of a technical direction, increases a lexicon of words, develops ability to conduct professional dialogues in sphere of professional work for the analysis of various situations on manufacture and conducting conversations with English-speaking representatives of the companies.</p> <p>Content: Mechanical engineering, technological process, mechanical treatment of metals, abrasive materials, measuring instruments, mills, thermal treatment, casting, welding, metals and alloys, cast iron, steel, detachable connections,</p>	3	v											

					plastics, mechanical processing of metals on milling machines.															
16		GED	OC	Information and communication technologies (in English)	<p>Purpose: 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>Contents: 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.</p>	5			v											v
17	Moduls of General Engineering	BD	UC	Higher Mathematics	<p>Purpose: perform the necessary measurements and related calculations, calculate the area and volume of parts of building structures, the volume of</p>	5			v											

	Disciplines				<p>earthworks, apply mathematical methods to solve professional problems</p> <p>Content: Determinants. Matrix. Methods for solving systems of linear equations. Vectors. Various equations of a straight line and a plane in space. Curves and surfaces of the second order. Subsequence. Function. Limits of sequences and functions. Complex numbers. Function derivative. Derivatives of higher orders. Indefinite and definite integrals. Multiple integrals of the I-th and II-th kind.</p>													
18		BD	UC	Physics	<p>Purpose: formation of knowledge of physical laws and skills of their application in engineering and production technology, development of skills for conducting and evaluating the results of theoretical and experimental research, development of scientific thinking based on an interdisciplinary approach.</p> <p>The laws of classical and modern physics (mechanics, molecular physics, thermodynamics, electromagnetism, optics, quantum and atomic physics). Application of knowledge of physical phenomena</p>	6		v	v									

					and processes to solve applied, technical and technological problems based on an interdisciplinary approach. Scientific research methods, methods of planning, conducting, processing and analyzing the results of theoretical and experimental research.													
19		BD	UC	Basics of interchangeability	<p>Purpose: Formation of knowledge of methods of maintenance of interchangeability, and also about methods and gauges and control with reference to conditions of the general mechanical engineering.</p> <p>Content: Interchangeability. Essence of standardization. Interchangeability principles. Admissions and landings. Rationing, methods and gauges and control of deviations of the form, an arrangement, a roughness and a sinuosity of surfaces of details, gear both worm gears. Interchangeability and control smooth cylindrical, carving, conic, keyed and spline connections. Calculation of dimensional chains</p>	5							v		v			v
20		BD	UC	Fundamentals of Cable Technology	Purpose: Formation of basic knowledge in the field of cable design, theory of power electric cables, their electrical and thermal													

				gy	calculation, characteristics and marking of various cable designs. Content: Twisted conductors. Roll options. Conductor structures. Sector conductive conductors. Distribution of electric field strength and voltage. Calculation of cable insulation thickness. Electric field regulation. Magnetic field in the cable. Useful power loss. Conductor resistance. Thermal calculation of the cable. Calculation of the allowable load current. Heating and cooling of the cable. Overload current.												
21		BD	UC	Standardization, certification and 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 Contents: Objects of standardization, certification and metrology. Legislative and regulatory framework for standardization, technical regulation, metrology and	4		v			v						

					conformity assessment systems General scientific and special methods of standardization. Certification and declarations 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														
22		BD	EC	Chemistry of metals	Formation of a modern understanding of metals, properties of various types of metal compositions, compounds; physical and chemical properties and alloys of metals, familiarization with the methods of affairs and the development of interest in modern technology and production, skills in setting and conducting chemical experiments, solving problems, formulating conclusions when discussing the results of chemical experiments. The position of metals in the periodic table and the general characteristics of their properties. s-metals .Group 1 metals. Metals of the 2-group. d and f are metals. Metals 3-groups, Metals 4- groups. Metals of the 5-group.	3					v	v		v					

					Metals of group 8-10.Metal alloys and their classification													
23		BD	EC	Theoretical Foundations of Inorganic Chemistry	The purpose of the discipline is to deepen students' knowledge in the field of inorganic chemistry, but also to help in the development of specific calculation schemes, a critical understanding of their real capabilities and limitations, to familiarize students with modern views on the theoretical foundations of inorganic chemistry. Describe the basic concepts and laws of chemistry, the theory of the structure of the atom and chemical bonds, the general laws of chemical processes, the main provisions of the theory of solutions, acids and bases, the basics of electrochemistry, the periodic law for describing the periodicity of changes in the properties of atoms. Generalize the processes in solutions, Apply skills in solving any chemical problems, the simplest calculations.						v	v		v				
24	Engineering Computer graphics	BD	UC	Engineering and computer graphics	The purpose: Formation knowledge, skills and abilities sufficient to compile engineering and design documentation using AutoCAD. Content: Projection. Point and	4			v				v		v			

					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.													
25		BD	EC	3D modeling and visualization in AutoCAD	<p>Purpose: Familiarization with the latest achievements in the field of computer-aided design, AutoCAD; formation of knowledge, skills and abilities to use CAD in the execution of design documentation and the creation of three-dimensional models.</p> <p>The Autocad interface. Configuring the Autocad work environment. Coordinate systems. Management and shift. Graphic primitives. Entering commands. Dimensioning Types and sections. Surfaces. Editing edges. Principles of 3D construction. Creating solid-state</p>	4		v				v		v				

					models. Building images in the AutoCAD graphics system. Transform the shape of the original model using AutoCAD editing commands. Placement of views. Explanation of the USDD.														
26		BD	UC	Fundamentals of Machine Design	<p>Purpose: Forms knowledge, ability, skills and competencies in students necessary for the development of industrial design and reverse engineering in mechanical engineering.</p> <p>The concept of industrial design. The ability to navigate in three-dimensional space. Willingness to effectively use the basic tools for creating objects, modify, edit objects or their individual elements. Three-dimensional models of real objects. Modeling in CAD applications. The concept of methods and algorithms for creating project documentation from a three-dimensional geometric model. Skills of using additive technologies in production. Basic principles of prototyping and 3D printing.</p>				v					v			v		
27	Fundamentals of machine parts	BD	EC	Theoretical Mechanics and Strength of	<p>Purpose: master general laws, methods of theoretical mechanics, materials resistance; form skills of using theoretical provisions of</p>	4								v	v				v

	design			Materials	<p>discipline in solving professional problems.</p> <p>Contents: 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.</p> <p>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>												
28		BD	EC	Engineering mechanics	<p>Purpose: formation of knowledge in field of strength, rigidity, stability of structures contributing to reliable operation of buildings, structures, development practical skills in carrying out calculations.</p> <p>Contents: Main provisions of statics, concept of force vector, force projection on axis, moment of force pair. Solids motion laws - body trajectory, speed, acceleration. Point motion differential equation, dynamics main problems. Main hypotheses, assumptions of materials resistance are axial</p>			v			v				v		

					tension-compression, transverse bending, shear, deformations' complex types, stress-strain state, compressed structural elements', structures' stability.													
29		BD	UC	Fundamentals of Design and Machine Parts	<p>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.</p> <p>Contents: 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	v	v			
30		BD	EC	Theory of mechanisms and machines	<p>Purpose: formation of knowledge about general research, machines, devices design methods, general principles of mechanisms interaction in a machine due to their</p>	6				v			v	v	v			

				kinematic, dynamic properties, about basics of structural, kinematic, dynamic analysis, synthesis of mechanisms. Contents: 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.													
31		BD	EC	Machine Mechanics	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. Contents: 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.				v			v	v	v			

					Precision of gear pairs, kinematic chains. Introduction to machines dynamics. Machines dynamics with rigid, variable links. Industrial robots structure, kinematics, dynamics.													
32	Fundamentals of Machines and Structural materials Technology	BD	EC	Introduction to Specialty	<p>Purpose of the discipline is the formation of general knowledge about the future specialty, the importance of the role of engineering, about production in power engineering, about methods of obtaining and processing blanks and parts, metalworking equipment and tools, the quality of the surface of machine parts and the accuracy of processing.</p> <p>Content. The role of the engineer in the design and quality assurance of the manufacturing process. The concept of the car and its official purpose. Electrical machines. Operational qualities of machines: efficiency, reliability, productivity, etc. Basic concepts of production and technological processes. Technological processes in mechanical engineering. Materials in mechanical engineering. The structure of machine-building production. Modern engineering</p>	3		v		v								v

					production.														
33		BD	EC	Fundamentals of Academic Writing	<p>Purpose: formation of the communicative competence of a specialist who is able to solve actual communication problems in various fields of professional activity by means of the Kazakh language.</p> <p>Content: Features of academic writing. General requirements for scientific work. Types of academic texts. Style of presentation. Errors in written scientific papers. Fundamentals of academic writing (abstract, review, analytical review, scientific communication). The structure of the academic community: research centers, publishing houses, journals. Orientation in the modern academic space. Rules for compiling a bibliographic description. Domestic and foreign standards. Types of abstracts. The structure of the abstract. The volume of abstracts of various types, the rules of registration, Types of reviews, the structure of the review.</p>			v		v									v
34		BD	EC	Materials Science	<p>Purpose: formation of knowledge about the atomic-crystalline structure of materials and the laws of its influence on the properties of</p>	4					v	v					v		

				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.													
35		BD	EC	Steels and Alloys of Energy Equipment	Purpose: formation of knowledge about modern structural materials used in the manufacture and repair of the main and auxiliary power equipment; about the impact of operational loads and harmful effects on the durability of equipment materials. Content. Materials in power engineering: composition and properties of metals and alloys. Carbon and alloy steels. Nonferrous metals. Thermal and thermo-mechanical processing. Types of destruction of metals. Material					v	v				v		

					selection for basic details. Influence of operation on the properties of structural metals. Requirements for the materials of power machines. Materials of pump casings, their erosion and corrosion resistance, crack resistance. Weldability of materials.														
36		BD	UC	Educational practice	<p>Purpose: to consolidate the theoretical knowledge gained in the educational program, to expand ideas about the future profession; to form professional adaptation and competencies in extracurricular activities.</p> <p>Content. Introduction. History and structure of the university. Participation in the laboratory base of the university. Safety engineering. Initial on-the-job training. Fundamentals of statics. The laws of motion of solid bodies - the trajectory of the body, speed, acceleration. The concept of the car and its official purpose. Electrical machines. Operational qualities of machines: working capacity, reliability, productivity, etc. Basic concepts of production and technological processes. Materials in mechanical engineering. Modern engineering production.</p>	1	v		v										v

37		BD	EC	Machine Engineering Technology	<p>Purpose: formation of students' skills in designing and developing technological processes for machining workpieces.</p> <p>Content of the discipline: Analysis of the manufacturability of the product design. Selection of the method of obtaining blanks. Development of the technological route of processing. Design of technological operations of machining parts on machine tools. Selection and justification of equipment. Take into account the factors affecting the accuracy of processing and the quality of the surfaces of the parts. Determine the sequence of surface treatment. Assign methods for obtaining blanks. Perform calculations of allowances and operational dimensions. Design technological processes for universal and special metal-cutting machines. To carry out technological rationing of operations.</p>	5				v			v	v	v			
38		BD	EC	Student's research work	<p>Purpose: formation of a comprehensive understanding of the specifics of research work; mastering research methods that are most relevant to the subject of research; acquisition of skills and</p>					v			v	v	v			

					<p>abilities of independent research activities.</p> <p>Content: The concept and principles of the organization of research work of students. Science as an activity. The concept and types of sources of scientific information. Goals and methods of studying scientific literature. Methods of taking notes of scientific and educational literature. Types of SRW, SERW The structure and content of the research work. Registration of scientific work. Design of the main structural elements of scientific work.</p>													
39	Fundamentals of Fluid and gas Mechanics	BD	EC	Fundamentals of hydraulics	<p>Purpose: form knowledge about equilibrium laws, motion of various liquids, methods of various structures hydro-mechanical calculations, devices, ways of practical application of these laws, research skills.</p> <p>Contents: Subject of hydraulics. Liquids properties. Hydrostatics. Kinematics, fluid dynamics. Laminar, turbulent flows. Local hydraulic barriers. Leakage of liquid through holes, nozzles. Pipes hydraulic calculation. Vane pumps, hydrodynamic gears. Fundamentals</p>	4						v	v					v

					of theory of vane pumps, operation calculations. Cavitation. Vortex, reactive piston pumps. Volumetric hydraulic machines, hydraulic drives. Hydraulic equipment. Hydrolysis, water tanks, working fluids.													
40		BD	EC	Hydro-mechanical Engineering	<p>Purpose: formation of knowledge about basic provisions of mechanics of real fluid used in engineering calculations, practical application of these provisions to solving various engineering problems.</p> <p>Contents: General provisions. Flow domain, its connectivity are the basic equations of hydrodynamics. Hydraulic resistances. Fluid movement in pipes, channels. Non-Newtonian fluids. Flow in thin liquid films. Hydro-mechanical phenomena modeling. Hydraulic modeling types. Cavitation phenomena in local hydraulic resistances, pumps. Two-phase flows. Gas-liquid mixtures. Plane-parallel motion of an ideal incompressible fluid. Viscous liquid hydromechanics.</p>						v	v						v
41		BD	EC	Computer Modeling	<p>Purpose: the formation of students' professional knowledge and skills in the field of engineering product</p>	4		v			v		v					v

				g in Machine Engineer ing	design, the development by students of a universal environment for automating the design process to obtain design documentation, both in terms of the quality of execution of documents that meet the USDD standards and compliance with the requirements of standards; the possibilities of solid-state spatial modeling. The role of modeling in science and technology and professional activity. Features of computer modeling. Principles of model construction. CAD/CAE/CAM systems and their role in the design and manufacture of products. Optimization, structural, geometric and graphical models. Modeling of complex systems. Surface and solid-state modeling.													
42		BD	EC	Compute r modeling of technical systems	Purpose: Familiarization of students with modern methods of computing and specialized software packages that are used to solve engineering problems on personal computers. Calculations using specialized software packages. Models, their types. Modeling. Stages of modeling. CAE/CAD systems. Basic concepts. History of			v			v		v				v	

					development of CAE/CAD systems. Examples of CAE/CAD systems. Capabilities of CAE/CAD systems. Methods used to solve problems in specialized software packages. The finite element method. Finite volume method. Advantages and disadvantages of the methods. General principles of building software packages implementing the finite element method and the finite volume method.													
43		BD	EC	Compressors and Compressor Stations	<p>Purpose: formation of knowledge for the selection and operation of the main and auxiliary equipment of compressor stations, as well as the principles of designing these stations.</p> <p>Contents: Dynamic and volumetric compressors of pneumatic systems. Cooling of compressed gas in compressors of pneumatic systems. Classification, fields of application, main parameters and characteristics, operating principle, types of structures, advantages and disadvantages of compressors. Purpose and classification of CS. The main equipment of the CS of the main gas pipelines. Selection of the main and auxiliary equipment</p>	4		v									v	

					of compressor stations. Calculation of the operating mode of compressor stations.													
44		BD	EC	Fundamentals of Designing Compressor Units and Pumping Units	<p>Purpose: Purpose: formation of knowledge for the design of compressor units and pumping units</p> <p>Contents: General information about the design of compressor units and pumping units. Technological schemes of compressor stations. Regulation of pumping station operation modes. Classification and current trends design of compressors. Design features and operational features. Theoretical foundations of ideal and real compressor units, energy indicators of their operation. Calculation and selection of compressors and auxiliary equipment of installations. Maintenance and repair of compressors. Wiring diagrams of technological devices. The main provisions and rules of technical operation of compressor units.</p>			v										v
45		PD	PP	Industrial Practice I	<p>Purpose: to consolidate knowledge in the study of theoretical and practical skills acquired by students in the study of general professional and special disciplines of the</p>	4				v		v						

				<p>educational program and gain skills in the field of technological processes of power engineering production.</p> <p>Content. Introduction. Safety engineering. Secondary on-the-job training. History and structure of the practice base. The main equipment in the technological process. Autocad interface. Classification and basic requirements for parts and components of machines. Automated design. Stages of machine design and development of design documentation. mechanical transmissions. Reducers. Shafts and axles. The main types of mechanisms. Manipulators, industrial robots. Fundamentals of metallurgical production. Manufacture of iron, steel. Production of non-ferrous metals and alloys. Powder metallurgy. Foundry technology. Metal forming technology. Technology of welding production.</p>														
46		BD	EC	Fundamentals of Pumping Liquids	The purpose of the formation of theoretical and practical knowledge and skills of students in the field of fluid pumping, the choice of pumping equipment for solving a	4						v	v	v				

				<p>specific problem and the laws in force during the operation of the pump, the theory of hydraulics, its concept of an "ideal" fluid.</p> <p>The content of Hydrostatics. Differential equation of Euler equilibrium. Indicators of fluid pressure strength. Basic laws of hydrodynamics, fluid flow and its parameters. Classification of types and modes of fluid flow. The equation of the transfer of the amount of motion (Navier-Stokes). The Bernoulli equation for an elementary trickle of an ideal fluid and for a flow of a real fluid. Equations of continuity of the fluid flow.</p>														
47		BD	EC	<p>Hydrodynamic machines and systems</p>	<p>Purpose: formation of theoretical and practical knowledge and skills among students in the field of hydrodynamic machines and systems, methods of accounting for pressure losses during the movement of liquids, the processes of leakage of liquids and gases through holes and nozzles, power sources of the main types of hydropneumose systems and the principle of their operation.</p> <p>Contents: General provisions and features of the theory of hydraulic</p>					v		v	v					

					systems and hydraulic machines. Classification of volumetric hydraulic motors. Volumetric hydraulic motors and their application. Critical analysis of parameters characterizing the operation of the hydraulic motor and pump. Classification of reciprocating (reciprocating) pumps, their properties and classification of rotary pumps. Varieties of multiple-acting hydraulic motors.													
48		BD	EC	Fluid and gas mechanics	<p>Purpose: formation of knowledge about the basic laws of equilibrium and motion of liquids and gases, allows solving problems of hydrodynamic calculations.</p> <p>Contents: Subject of fluid mechanics. Methods. Models of the liquid medium. The hypothesis of continuity of the medium. Forces acting on the liquid. The pressure in the liquid. Basic physical properties of liquids and gases. Hydrostatics. Kinematics and fluid dynamics. Fundamentals of hydrodynamic similarity. Laminar flow. Turbulent flow. Local hydraulic resistances. The outflow of liquid through the holes and nozzles. Hydraulic calculation of pipelines. Unsteady</p>	5					v	v						v

					fluid movement in the pipes. Interaction of the flow with its bounding walls. Fundamentals of gas dynamics.													
49		BD	EC	Fundamentals of thermodynamics	<p>Purpose: formation of basic knowledge of modern thermodynamics, heat engineering fundamentals, implementation of systematic study of physical processes and phenomena in energy systems, thermal devices, machines, methods of their mathematical description.</p> <p>Contents: basic concepts and laws of thermodynamics. Thermodynamic system and its state. Basic thermodynamic processes, thermodynamic, phase equilibria. Energy characteristics of thermodynamic systems. General characteristics of thermodynamic cycles, piston engine cycles, compressor machine cycles, multistage compressors. Heat pumps. Basic concepts, definitions of heat transfer theory. Heat transfer, thermal insulation.</p>					v	v	v						
50		PD	EC	Industrial practice II	<p>Purpose: consolidate knowledge and in-depth study of the practical activities of enterprises / plants for the energy engineering production of pumps and pumping</p>	6						v	v					

					<p>units, hydrodynamic machines and systems.</p> <p>Content: Introduction. Safety engineering. History and structure of the practice base. Objects of standardization, certification and metrology. Structure and properties of metals and alloys. Steel and cast iron. Non-ferrous metals and alloys. Manufacturability of the design. The choice of the method of obtaining blanks. Development of a technological processing route. Selection and justification of equipment. Hydraulics. Hydrostatics. Pumps and hydrodynamic transmissions. cavitation. Volumetric hydraulic machines and hydraulic drives. The role of modeling in science and technology and professional activities. Principles of building models. CAD/CAE/CAM systems. Liquid medium models. Kinematics and fluid dynamics. Welding and its essence. Types of welding, their classification. welding equipment.</p>													
51		PD	EC	Pumps and pumping units	Objective: to acquire theoretical and practical knowledge in the field of pump operation for professional selection of pumps in the design of engineering systems and their	6				v			v	v				

				operation. Contents: The main types and types of pumps and pumping units, the purpose of their main components and parts; parameters and characteristics of pumps; conditions of use of pumps; methods of their selection; rules of operation of pumping units. Hydro-mechanical and power equipment of pumping stations and pumping units. Automation and operation of pumping stations; pumping station buildings, internal communications, pressure pipelines.														
52		PD	EC	Designing and Manufacturing of Pumps and Shutoff Valves	Purpose: formation of students' competencies in the general characteristics of pumps and shut-off valves, pump and blower designs, general issues of pump and shut-off valve design Classification of pumps and fittings, the main components and parts of pumps, their hydraulic characteristics. Types of structural design of pumps, assembly basics and calculation features of the pump housing, pump covers, efficiency. Valve classification: locking, adjustment, safety, control. Hydraulic calculations of the main characteristics of pumping systems				v			v	v					

					and valves: shut-off, regulating, safety, control. Development of structural design of pumps, taking into account the basics of design and processing features.															
53		BD	EC	Technological Processes of Machine Industries	<p>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.</p> <p>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 electrochemical processing methods. Technology for the production of blanks and machine parts from non-metallic materials.</p>	5				v	v	v					v			
54		BD	EC	Fundamentals of Foundry	<p>Purpose: Forms theoretical knowledge of bases of foundry manufacture and the equipment</p>								v				v			v

				Engineering and Machinery	used at the foundry enterprises. Content: Modeling complete sets. Properties of forming materials and mixes, their preparation. Technological process of manufacturing castings. Fillets. Allowances in foundry models. Rod signs. Non-stick paints, pastes. Ways of a supply of metal in the form and designs gating systems. Ladles for pouring of forms, automatic pouring-portioning devices. Cooling castings and their knockout from forms. A stump, clearing and thermal processing castings. Definitive delivery castings. Ways of correction defects of castings. Hardening and cooling castings. Special kinds of moulding.													
55		BD	EC	Welding Production and Technological Machinery	Purpose: Formation of knowledge about welding production, theoretical and practical foundations of welding, cutting and technological equipment, about power sources, types of electrodes and other welding materials. Welding and its essence. Types of welding, their classification. Electric arc and its properties. Welded joints, seams, materials. Additive materials. Electrodes,	6			v					v				v

					fluxes, shielding gases. Welding transformers and rectifiers, converters and units, power supply devices. Automatic arc welding. Special types of welding and soldering and their technological equipment. Weld quality control.													
56		BD	EC	Production of welded structures	Purpose: formation of students' competencies necessary to carry out design activities related to the design of welded structures in mechanical engineering. Contents: Materials for welded structures. Types of welded structures. Manufacturability of welded structures. Complex mechanization and automation of welding processes. Determination of the level of mechanization of welding operations. The limits of rational use of various types of welding. Factors that determined the choice of the type of welding and the technique of forming welds. The method of establishing welding modes. Selection of welding equipment. Ways to increase productivity in the manufacture of welded structures. Conducting quality control of joints as an integral part of the technological process of manufacturing				v				v					v

					structures.														
57		PD	EC	Development of Technological Processes for Manufacturing Case-Type Parts	<p>Purpose: formation of students' skills in designing and developing advanced technology for processing body parts.</p> <p>Performing an assessment of the manufacturability of the product design. Determination of the type of production, the sequence of processing technology development, numbering of the surfaces to be processed, selection of the initial workpiece and methods of their production. Generates operations and operational sketches. Justification of the choice of equipment. Calculation of allowances by analytical methods. Selection of cutting modes during machining. Rationing of technological operations. Registration of technological documentation. Selection of installation elements. Analysis of ensuring the accuracy of processing. Design of clamping devices.</p>	4					v		v		v				
58		PD	EC	Calculation and design of hydrodynamic	<p>Purpose: formation of knowledge about system approaches to solving problems in the design of hydraulic machines.</p> <p>Contents: Direct and inverse</p>							v	v	v					

				machines	hydrodynamic problems in the design of machines. Problems of strength calculations in the design of machinery and equipment. Stages of product development and quality control of design documentation. Methods of creating machines based on the unification of parts and assembly units. Types of tests and test benches, the procedure for certification of test benches. Types of tests of vane pumps, stands used and methods of processing experimental data using similarity theory. Examples of solving non-standard technical problems													
59		PD	EC	Installation and repair of pumps and pumping stations	<p>Purpose: formation of knowledge about the organization, installation and repair of pumps and pumping stations, the ability to provide technical equipment for workplaces with the placement of technological equipment; the ability to master the equipment being introduced</p> <p>Content: Rules for maintenance of pumps and pumping stations; Planning maintenance and repair of pumps and pumping stations. Technical diagnostics. Repair of equipment; technology of restoration and repair of parts and</p>	4						v	v	v				

					components of the object; Industry standards and regulations, technical conditions for equipment repair; safety during operation and repair of pumps and pumping stations.													
60		PD	EC	Service and Upgrade of Energy-Generating Machines	<p>Purpose: formation of knowledge necessary for maintenance and adjustment of power machines, study of forms of supervision and maintenance of equipment.</p> <p>Contents: Basic concepts of maintenance and adjustment of energy machines. Organization of the maintenance process of energy machines. Types and frequency of maintenance. Malfunctions of the energy machine. Drawing up and adjusting the schedule of machine use. Organization of commissioning works. Adjustment of units of power machines units. Information on the commissioning and operation of power machines. Monitoring and diagnostics of machines. Typical scope of work in the maintenance of energy machines.</p>						v		v					v
61		PD	EC	Operation and diagnostics of pumps	The purpose of the discipline: the formation by students of the knowledge necessary for the operation and diagnostics of pumps and pumping units, the study of	4				v				v	v	v		

				and pumping units	forms of supervision and maintenance of equipment. Contents: The current state of pumps and pumping units, their operational properties and factors affecting their operation. Operational properties of pumps and pumping units. Factors affecting the operation of pumps and pumping units. Technological process of operation and diagnostics of machines. Control and adjustment work. Diagnostics of the technical condition of pumps and pumping units, methods of equipment diagnostics. Work with documents on operation and diagnostics of pumps and pumping units.													
62		PD	EC	Quality management of power engineering	Purpose: Acquisition of knowledge on the organization of product quality management at power engineering enterprises, necessary to ensure quality control processes, development, implementation and support of the quality management systems. The concept of "quality". Multifaceted quality. Stages of development. Competitiveness, quality and cost. Quality management as a factor in the						v	v					v	

					success of an enterprise. System features of quality management processes. Qualimetry. Services for product quality management in power engineering. Certification. Quality system based on ISO 9000 series.														
63		PD	EC	Reliability and Service Life of Pumping Equipment	<p>Purpose of the discipline is to form knowledge about methods for assessing the reliability and durability of pumping equipment at the design, operation stage, about predicting and preventing equipment failures, and studying methods for diagnosing operating equipment.</p> <p>Content. Basic concepts and definitions of reliability. Reliability, durability, maintainability and storage. Physical foundations of reliability. Factors affecting the reliability and durability of machines. Types of failures of pumping equipment. Ensuring the reliability of equipment at the stages of design, manufacture and operation. Operation of pumping equipment. Cavitation, corrosion resistance of pumping equipment. Methods for ensuring optimal reliability of pumping equipment. Calculation of</p>	4				v			v					v	v

					reliability indicators.					v			v					v	v
64		PD	EC	Reliability and Operation of Hydraulic Machinery	<p>Purpose of the discipline is to form a system of professional knowledge among students about the methods of ensuring the reliability of hydraulic machines.</p> <p>Content: Qualitative and quantitative characteristics of reliability. Ensuring reliability at the stage of object manufacturing. Hydraulic equipment failures. Basic concepts and characteristics of the operation of hydraulic machines. Forecasting the reliability of an object during operation. Factors affecting the performance of hydraulic machines. Reservation methods and their effectiveness. Methods for calculating reliability indicators. Methods for assessing the quality of functioning of hydraulic machines. Methods and means of technical diagnostics of elements, assemblies, devices, systems and working fluids. Problems of development of hydraulic machines, and the main directions for improving their performance.</p>					v			v					v	v
65		PD	EC	Calculation and design of	Purpose: Formation of knowledge on the methodology and progressive methods for designing	5				v			v		v				

				<p>pumping station equipment</p> <p>and calculating the main and auxiliary equipment of pumping stations.</p> <p>Classification and types of pumps, Components and parts, hydraulic and mechanical characteristics. working bodies. their design and calculation. Hydraulic calculations. Motor selection. Cavitation in pumps, forces on the wheel and rotor. Pumping stations, types, schemes, auxiliary equipment. Settlement mode of operation. Buildings of pumping stations. Auxiliary systems of the station. Technical and economic calculations and specific indicators.</p>													
66		PD	EC	<p>Hydraulic Strength Analysis of Units and Parts</p> <p>Purpose: formation of knowledge and development of methods for calculating the strength reliability of hydraulic equipment – one of the main quality indicators.</p> <p>Content: complex issues related to the rational use of hydraulic machines in all cycles of machine operability. The theory of strength calculation of parts and assemblies of machine-building structures, hydraulic machines and hydraulic transmissions and the theory of strength reliability of structures. The effectiveness of kinematic and</p>					v			v		v			

					constructive schemes. Strength calculations of system elements, assemblies and parts and technical and economic calculations of the effectiveness of decisions made. Modern graphic editors and elements of automated design systems.													
67		PD	EC	CAD-CAE systems in machine engineering	<p>Purpose: Formation of students' basic knowledge about the application of modern computer modeling technologies to solve problems of design and technological preparation of production.</p> <p>Product life cycle. Marketing research. Designing. Preparation of production. Production management. Operation, maintenance, disposal. The concept of PLM technology. General information about CAD systems (CAD/CAM/CAE/PDM) and CAD computer graphics (MCAD). CAE functions as part of CAD/CAE/CAM. Integration and data transfer. Classification of CAD-CAE programs. Solving applied problems by means of CAE. Solving theoretical problems performing unique computational experiments in CAE. Correction of</p>	5			v									v

					computer calculations.				v		v							
68		PD	EC	Mechatronic Systems in Machine Engineering and Their Modeling	<p>Purpose: formation of knowledge about the information and methodological base for the study of special disciplines, as well as the acquisition of practical skills in the analysis and synthesis of mechatronic objects.</p> <p>Contents: Basic categories and principles of mechatronics, Creation, implementation and provision of optimal functioning of mechatronic and robotic systems. Tasks of developing individual subsystems and devices, including structural elements, drives, information sensors, microprocessor control devices; software for solving design control problems; debugging, testing and modernization of mechatronic devices and systems, their reprogramming, training and integration into automated systems.</p>				v		v							
69		PD	EC	Automation of Power Engineering Industrial Manufacturing	<p>Purpose: Formation of students' basic knowledge about the automation of production processes in the field of power engineering, acquisition of skills and skills of using equipment</p> <p>Contents: Automation of existing and projected production processes.</p>	4			v		v							v

				<p>turing Processes</p> <p>Types and types of production automation. Stages of automation development. Automation of machining processes. Automation of installation and fixing of work pieces and tools. Automation of transport and warehouse production systems. Automated power equipment. Automation schemes of typical technical processes. Remote automatic control of objects. Analog and digital automatic regulators. Classification of control objects in technical systems. Features of technological processes as control objects.</p>														
70		PD	EC	<p>Automated System of Technological Process Control</p> <p>Purpose: formation of students' knowledge on the theory and techniques of automated control, the hierarchy of systems, the principles of their construction. Contents: Modern technical means of automation. Technical preparation of automated production. Industrial automatic control systems. Automation schemes of typical technological processes. Computer integration of production; Software and information support of technological process automation systems; Design of automated</p>				v		v								v

					production facilities; Development of computer-aided design systems. Methods of control theory, modeling methods in the construction of automated control systems.													
71		PD	EC	Design of drives in machine engineering	<p>Purpose: The formation of a complex of knowledge on the device, the prospect of using the knowledge gained in the development of new technology in the field of engineering.</p> <p>Contents: The structure of the components, the structure and characteristics of various drives, applications. An algorithm for designing drives of machines and mechanisms. Comparative characteristics of different types of drives. The principle of operation, basic concepts, characteristics and classification of volumetric drives. Block diagrams and components of the drive. Energy calculation of the drive and the choice of a volumetric engine. Calculation of the main parameters and selection of standard sizes of hydraulic machines and hydraulic devices.</p>	4		v		v		v	v			v		
72		PD	EC	Technological Tooling	The purpose of the discipline: the formation of theoretical knowledge and practical skills of calculation							v	v			v		

				Design	and selection of technological equipment, classification and technical and economic indicators. The concept of technological equipment and its classification. Classification of machines, efficiency, efficiency and reliability, types of failures. Safety at work. Principles of installation of workpieces on devices. Fastening of workpieces, clamping devices of machine tools. Method of calculation of clamping forces. Classification and types of clamping devices. The batteries of the devices. Devices that coordinate the position of the cutting tool. Devices for drilling, turning, milling machines.													
73		PD	EC	Design of circuits and control equipment for pumping units	<p>Purpose: Formation of students' holistic systematic understanding of the design of control schemes for pumping installations, as well as skills and abilities in the field of design work in the production of pumping equipment at domestic enterprises and organizations..</p> <p>Contents: Considers the requirements for the control system of pumping units. Studies the construction on the basis of a programmable controller, whose</p>	4		v					v		v			

					functions include the analysis of information about the state of the object coming from sensors and the development													
74		PD	EC	Design of Electrical Control Systems for Machines	<p>Purpose: familiarization of students with the methods of processing technological processes in the design of electrical control systems of machines. Consideration of examples of problem solving in the design of control systems for discrete, continuous objects.</p> <p>Contents: The concept of designing electrical control systems for machines. The specifics of designing time management systems, software object management systems. Examines the design process, trends in changes in its components, the general algorithm of the design process.</p>				v				v				v	
75	Module of new professional competencies acquisition	BD	EC	Subjects in the additional educational program	Minutes No. 563 dated 31.08.2018 Additional educational program (Minor) (minor) - a set of disciplines and (or) modules and other types of educational work, determined by students for study in order to form additional competencies.	12		v		v			v				v	v
76	Module of final	PD	EC	Pre-degree	Purpose: obtaining by students an in-depth study of power	10		v		v			v				v	v

	certificati on			or industrial practice	<p>engineering production, organization of the technological process of manufacturing parts and components for power machines and equipment.</p> <p>Content. Introduction. Safety engineering. History and structure of the practice base. Evaluation of the manufacturability of the design. Production type. Choice of equipment. Maintenance of pumps and pumping stations; The current state of pumps and pumping units. Technological process of operation and diagnostics of machines. Basic concepts and definitions of reliability. Classification and types of pumps. Motor selection. Product life cycle. Marketing research. Design. Information about CAD (CAD/CAM/CAE/PDM) and computer graphics CAD (MCAD). Types and types of production automation. Stages of development of automation. Device components, structure and characteristics of various drives, applications.</p>													
77				Writing and Defending a Thesis, a Graduate	The goal is to form practical skills of conducting an analytical review; self-selection of ways to improve existing technologies for the production of power equipment	8	v	v	v	v	v	v	v	v	v	v	v	v

				<p>Work, or Preparing and Passing a Comprehensive Exam</p>	<p>parts Content: Official purpose of the details of the power equipment. Analysis of the manufacturability of the part design. Determination of the type of production. Selection and justification of the workpiece. Selection of databases. Determination of allowances. Development of the technological process of manufacturing parts of power equipment. Assignment of cutting modes. Definition of time norms. Designing a fixture. The principle of operation of the device. Design of a mechanical assembly shop. Determination of the number of machines and equipment. Occupational health and safety.</p>												
					Total	240											

**2 SUMMARY TABLE SHOWING THE VOLUME OF REPAID
LOANS IN THE CONTEXT OF THE EP MODULES**

Course of Study	semester	Number of master modules	Number of disciplines studied			Number of KZ credits					Total in hours	Total loans KZ	quantity	
			CS	UC	EC	Theoretical teaching	Physical education	educational practice	Internship	final examination			Exam	Dif. offset
1	1	5	4	1	2	28	2				900	30	6	1
	2	3	1		3	27	2	1			900	30	6	2
2	3	6	1	3	5	28	2				900	30	6	4
	4	6	2		4	26	2		4		900	30	6	1
3	5	4			8	30					900	30	6	2
	6	5		1	3	23			7		900	30	4	
4	7	4			5	20					600	20	5	
	8	4		2	2	20					600	20	4	
	9	1							8	12	600	20		
Total			8	7	32	202	8	1	19	12	7200	240	43	10

3 TRAINING STRATEGIES AND METHODS, MONITORING AND EVALUATION

<p>Learning strategies</p>	<p>Student-centered learning: The student is the center of teaching/learning and an active participant in the learning and decision-making process.</p> <p>Practice-oriented training: orientation to the development of practical skills.</p>
<p>Teaching methods</p>	<p>Conducting lectures, seminars, various types of practice:</p> <ul style="list-style-type: none"> • application of innovative technologies; • problem-based learning; • case study; • work in a group and creative groups; • discussions and dialogues, intellectual games, • Bloom's taxonomies; • presentations; • rational and creative use of information sources: • multimedia training programs; • electronic textbooks; • digital resources. <p>Organization of independent work of students, individual consultations.</p>
<p>Monitoring and evaluation of the achievability of learning outcomes</p>	<p>Current control 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"> • survey in the classroom; • testing on the topics of the discipline; • control works; • discussions; • trainings; • colloquiums; • essays and others. <p>Boundary control 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>Forms of holding:</p> <ul style="list-style-type: none"> • exam in the form of testing; • oral exam; • written exam; • project protection; • protection of practice reports. <p>Final state certification.</p>

7 EDUCATIONAL AND RESOURCE SUPPORT

<p>Information Resource Center</p>	<p>There are 6 subscriptions, 16 reading rooms, 2 electronic resource centers (EIC) in the structure of the EIC. The basis of the EIC network infrastructure is 180 computers with Internet access, 110 automated workplaces, 6 interactive boards, 2 video files, 1 video conferencing system, 3 scanners of A-4, 3 format. EIC software - AIBS "IRBIS-64" for MSWindows (basic set of 6 modules), an autonomous server for uninterrupted operation in the IRBIS system.</p> <p>The library fund is reflected in an electronic catalog available to users on the http://lib.ukgu.kz website on-line 24 hours 7 days a week.</p> <p>Thematic databases of their own generation have been created: "Almamater," "Works of Scientists at SKU," "Electronic Archive." Online access from any device in 24/7 mode by external link http://articles.ukgu.kz/ru/pps.</p> <p>Working with catalogs in electronic form. The EC consists of 9 databases: "Books," "Articles," "Periodicals," "Proceedings of the PPS YUKGU," "Rare Books," "Electronic Fund," "SKU in Print," "Readers" "South Kazakhstan region."</p> <p>EIC provides its users with 3 options for accessing their own electronic information resources: from the Electronic Catalog terminals in the catalog hall and EIC divisions; through the university's information network for faculties and departments; remotely on the library website http://lib.ukgu.kz/</p> <p>Access to international and republican resources is open: "SpringerLink", "Envoy", "Web of Science", "EVSSO", "Epigraph", to electronic versions of scientific journals in open access, "Zan", "RMEB", "Adebiet", Digital library "Akpigress", "Smart-kitar", "Kitar.kz", etc.</p> <p>For people with special needs and disabilities, the library's website has been adapted to the work of visually impaired users in the JRC</p>
<p>Materialtechnicalbase</p>	<p>EP is implemented in 7 educational and research laboratories, a computer class connected to the Internet, 2 audiences are equipped with an interactive board and a multimedia projector, a teaching and methodological office. Laboratories of the department</p> <p>114 main building - Educational research, scientific laboratory of mechanical tests named after A. Ainabekov;</p> <p>116 main building - Educational and research laboratory of</p>

	<p>cutting theory;</p> <p>126B - educational laboratory "Theory of machines and mechanisms";</p> <p>128 B - educational laboratory of materials science,</p> <p>131B - training laboratory "Engineering Technology";</p> <p>134B - training laboratory "Machine Details";</p> <p>136B - educational laboratory "Materials Science and Foundry Processes";</p> <p>Building 16 - training and research workshop.</p> <p>Classroom fund: in the presence of a specialized cabinet of physics, chemistry and mathematics, as well as a computer class of 133B.</p>
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AGREEMENT SHEET

by Education Program 6B07124 – «Electrotechnical machinery and energy systems engineering»

Director of AID _____ A. Naukenova
sign

Director of ASD _____ U. Nazarbek
sign

Director of DEK _____ T. Bazhirov
sign

REVIEW

for the educational program 6B07124 – " Electrotechnical machinery and energy systems engineering "

1. Brief description of the company and the profile of its activities

KARLSKRONA LC/AB LLP is a manufacturer of pumping, electrical, non-standard equipment and shut-off valves used in the field of water supply, water treatment, heating, sewerage, and the company also cooperates and supplies equipment to non-users and other industries.

The company provides consumers with professional and prompt warranty and post-warranty service (preventive maintenance and emergency repairs).

KARLSKRONA LC/AB LLP pays great attention to the development of its Service Service, expanding the range of services provided, and improving the skills of employees. The plant is equipped with modern machine-building equipment and advanced technologies, including metalworking machines and machining centers. KARLSKRONA LC/AB LLP is an authorized service partner of the world's largest equipment manufacturers.

2. Relevance and relevance of the EP

According to the instruction of the Head of State of the Republic of Kazakhstan Kassym-Jomart Tokayev, the Atlas of New Professions project has been prepared under the leadership of the Ministry of Labor and Social Protection of the Population. The main goal is to predict the future, to identify professions that will become relevant in the future. The project includes nine areas, including the oil and gas industry and energy, tourism, IT technology, mechanical engineering and many others.

Mechanical engineering is characterized by a high level of multiplicative returns on related sectors of the economy. The greatest multiplicative effect on other sectors of the economy among machine builders in Kazakhstan are enterprises that produce electrical equipment. As a result of the adoption of the State Program of industrial and innovative development of Mechanical engineering of the Republic of Kazakhstan, six branches of mechanical engineering were declared priority. It was decided to provide these industries with benefits as a priority and create conditions for their development.

If we consider electrical engineering, then Kazakhstani enterprises located in the cities of Kentau, Shymkent and Uralsk produce small and large power transformers, shut-off valves, power plants, pumping equipment, batteries, control cabinets, cable and wire products, etc. Key enterprises of the sector: Kentau Transformer Plant LLP, KARLSKRONA LC/AB LLP, Asiatrafo LLP, KazmedpriborHolding LLP, etc. These enterprises produce products using modern technology and conforming to the standards of European countries. Pumps have become the most widespread among energy systems. Pumps are used in almost all spheres of human activity: from the garden plot to the space station and from utilities to nuclear power. The dynamics of own production of centrifugal pumps in

Kazakhstan stagnated at around 11,000 pumps per year, and export figures are declining annually. If in 2017 exports amounted to 10366 units of pumps, then in 2019 exports fell to 1704 units per year! And this directly depends on the lack of their own scientific developments in pumping. Therefore, the problem of personnel training for electrical engineering enterprises is very relevant.

3. Learning outcomes and competencies, their relationship to the demands of the labor market

The competencies of the graduate in EP 6B07124 – "Electrotechnical machinery and energy systems engineering" meet the expectations and requirements of modern production of electrical engineering profile. The learning outcomes of the educational program are formed as follows:

- carry out technological processes for the design and production of electrical and power equipment, design new and modernize existing power plants, provide technical management of power plants of various types;

- expand the scope of application of the latest technologies and structural materials in mechanical engineering, reduce the launch time of new products in production, contribute to the growth of the need for the production of innovative products of domestic engineering, change consumer preferences and introduce, design and manage industrial robots at machine-building enterprises;

- design and design pumping equipment and systems taking into account the basic physical properties of liquids and gases, the laws of hydrostatics and hydrodynamics, strength, rigidity and stability of engineering structures and their elements;

- design schemes and methods of installation and commissioning and maintenance work, methods of organization, testing and maintenance of technological processes, operate and maintain pumps and their auxiliary equipment;

- to carry out design activities using special programs (CAD modeling, FEM modeling), information and digital technologies; to make and justify specific technical decisions when creating objects of electrical and power engineering.

The level of development of professional competencies determines the competitiveness of a specialist in the labor market as a professional who is able to apply the acquired knowledge in a specific practical situation in order to obtain the desired result at the lowest cost and in the optimal time.

4. Availability of components that develop practical skills

A number of components of the modules of the educational program are aimed at acquiring students' practical skills in the specialty. The EP includes components that form professional competencies and develop practical skills – Design and manufacture of pumps and shut-off valves, Calculation and design of hydrodynamic machines, Calculation and design of pumping station equipment, Design of circuits and control equipment for pumping units, Automation of production processes of power engineering, Installation and repair of pumps and pumping stations, Quality management of power engineering.

Consolidation and deepening of theoretical knowledge and professional competencies, as well as gaining experience in independent professional activity is impossible without passing professional practice. The practice aims at the comprehensive development of students of all types of professional activities, the formation of general and professional competencies, as well as the acquisition of the necessary skills and experience of practical work in the specialty. The EP provides for conducting all types of practices on the basis of concluded contracts with practice bases. The goals and objectives of the practice at different stages of training students differ from each other, but they are organically linked with other forms and methods of training. The practice is included in the training module with disciplines whose theoretical knowledge it is intended to consolidate.

5. Content of the educational program (modules, disciplines)

EP 6B07124 – "Electrotechnical machinery and energy systems engineering" is developed on the basis of a modular approach to the construction of the program. The EP contains general, interdisciplinary, specialty modules and additional modules that go beyond the qualification. Each group of modules is aimed at obtaining the relevant competencies presented in the corresponding tables "Content of modules". As a result of mastering each module, students acquire certain competencies. Disciplines are organized into modules in order to obtain certain professional competencies. The modules of the specialty include disciplines that meet the modern requirements of machine-building enterprises. It is particularly necessary to note such important competencies that allow performing engineering projects of high-tech electrical equipment using modern design methods to achieve optimal results taking into account economic and environmental constraints; plan and perform numerical experimental studies, process and analyze results, participate in testing of electrical engineering facilities; perform repair, installation, service of electrical equipment and power systems, diagnostics of the technical condition of complex components and mechanisms.

6. The quality of the modular directory

The modular reference book contains a description of modules, disciplines, the volume in credits and the workload of students in hours. The modules are designed taking into account the logical connection and sequence of studying disciplines, which allows you to gradually increase the level of acquired competencies.

7. Conclusion on EP

6B07124 – "Electrotechnical machinery and energy systems engineering" fully complies with the requirements of the state standard of higher education (bachelor's degree), the Professional Standard "Mechanical Engineering", the Industry Qualifications Framework for the field "Mechanical Engineering", as well as the Atlas of new professions and competencies of Kazakhstan" and the requirements of the labor market of the relevant industries and the requirements of employers.

The educational program 6B07124 – "Electrotechnical machinery and energy systems engineering" is aimed at training competitively capable specialists with

conceptual knowledge in the field of engineering and technology, general and professional competencies, with practical skills in designing electrical and energy machines, taking into account the principles of energy and resource conservation; capable of conducting effective scientific work in the field of power engineering, critically evaluating its results and striving to learn the latest achievements and advanced scientific research in the field of mechanical engineering.

General manager

«KARLSKRONA LC / AB» LLP _____ Akhmetov U.B.
signature

REVIEW

for an educational program 6B07124 – "Electrotechnical machinery and energy systems engineering" developed at the M. Auezov SKU, Shymkent

1. Brief description of the company and the profile of its activities

«Electroapparat» LLP is a specialized electrotechnical enterprise with a long history and traditions, founded on May 1, 1960. Currently, the plant produces a wide range of electrical products: High-voltage switches for 6-10 kV: vacuum VBEM, VBM, VBP VBE for currents 630, 1000, 1600A; electromagnetic VEM-10E; low-oil VMPE-10; autogas load switches VNAP and VNAL with fuses and grounding knives. AC disconnectors of the internal installation RLND-10, RVZ-10. Distribution cabinets PR and VRU. Lighting panels of the SCHO and SCHA. Medium-voltage and high-voltage complete devices. Spare parts for manufactured products of high-voltage equipment (HVA). Energy. Passenger car and rail transport. Construction. Communal services. Medical equipment. Procurement and welding production. Machining production. Foundry production. Tool production. Blacksmithing production. Production of electroplating. Painting and impregnation production. Production of parts from plastics and rubber compounds. Assembly production.

2. Relevance and relevance of the EP

Power engineering engineering is the basic branch of mechanical engineering. Literally no company is able to work without machines and machines. Therefore, specialists who are well versed in this issue are in demand in any modern company, in any production. Specialists of this EP will be engaged in the design, design and maintenance of various machines used in the energy sector. The company may be responsible for the installation, commissioning and maintenance of power plants. They monitor compliance with safety regulations. In the conditions of research centers, they work on improving machines and equipment, conduct experimental launches, and lead theoretical developments. The demand for OP covering all branches of the national economy is determined by the need of modern enterprises for specialists in the organization and management of machine-building workshops and factories. Due to the focus of the OP on obtaining relevant competencies by graduates, it will be in demand, especially in the coming years.

3. Learning outcomes and competencies, their relationship to the demands of the labor market

The results of training and the competence of the graduate in 6B07124 – "Electrical engineering and power systems engineering". they meet the expectations and requirements of modern machine-building industries. As a result of studying the discipline, the student must have the following competencies: ability to understand the principles of constructing images and drawings of geometric objects; rules for design documentation in accordance with ISO standards, ESKD/ESTD. Be able to perform calculations, design and graphically present information about processes and objects;

carry out engineering projects of high-tech power equipment using modern design methods to achieve optimal results, taking into account economic and environmental constraints; the ability to use standard software tools in the design of technologies and equipment, to present schematic diagrams of the main and auxiliary equipment, to be ready to use the basic concepts, laws and models of thermodynamics, chemical kinetics, heat and mass transfer.

4. Availability of components that develop practical skills

A number of components of the modules of the OP specialty are aimed at the acquisition by students of practical skills in the specialty. These are disciplines related to the design of technological processes, automation of the design of hydrodynamic machines and maintenance and commissioning of energy machines.

As a result of completing course projects and mastering disciplines, students gain practical skills in developing progressive technological processes and optimal production modes for simple types of products or its elements.

Practical training after each course of theoretical training, as well as pre-graduate practice, allows you to consolidate the knowledge gained and acquire practical skills in production. Modern machine-building enterprises are presented as bases of the proposed production practice, the profile of which fully corresponds to the direction of training in the educational program.

5. Content of the educational program (modules, disciplines)

EP 6B07124 – "Electrical machinery and power systems engineering" was developed on the basis of a modular approach to the construction of a training program in the specialty of Mechanical Engineering. It contains general, interdisciplinary, specialty modules and additional modules that go beyond the qualification. Each group of modules is aimed at obtaining the relevant competencies presented in the corresponding tables "Content of modules". As a result of mastering each module, students acquire certain competencies. The disciplines are coordinated with the specialists of Electroapparat LLP and are aimed at acquiring certain professional competencies. The modules of the specialty include disciplines that meet the modern requirements of energy engineering enterprises. Of particular note are such important disciplines: 3D modeling and visualization in AutoCAD, Pumps and pumping units, Electrical engineering and electric drives, Calculation and design of hydrodynamic machines, Maintenance and commissioning of power machines.

6. The quality of the modular directory

The modular reference book contains a description of modules, disciplines, the volume in credits and the workload of students in hours. The modules are designed taking into account the logical connection and sequence of studying disciplines, which allows you to gradually increase the level of acquired competencies.

7. Conclusion on EP

The educational program EP 6B07124 – "Electrotechnical machinery and engineering of energy systems" developed at the M. Auezov SKU fully complies with the requirements of the state standard of higher education (bachelor's degree), the Professional standard "Mechanical Engineering", the Industry qualifications framework for the field "Mechanical Engineering", and the "Atlas of new professions and competencies of Kazakhstan, as well as the requirements of the labor market relevant industries and employers' requirements.

The educational program "Electrical engineering and power systems engineering" is aimed at training modern specialists with deep professional knowledge, skills and abilities expected by managers of modern industries.

Director of «Electroapparat» LLP _____ Suvorov A.C.
signature

REVIEW

for an educational program 6B07124 - "Electrotechnical machinery and energy systems engineering "

1. Brief description of the company and the profile of its activities

ShZ Etalon LLP offers its customers goods and services in the field of engineering services: Repair of electric meters, repair and verification of scales of all types and limits (laboratory analytical, household, medical, automobile, wagon), repair and verification of pressure gauges of all types and limits, repair of electrical and radio measuring devices, repair of presses, bursting machines, dynamometers, repair of household radio equipment, electrical engineering, rewinding and restoration of electric motors, turning, milling, manufacture of metal structures, metal products (parts, spare parts, bolts, nuts, screws, studs, shafts, etc.), manufacture of hinged chains for cement production furnaces, special bolts of all sizes for fastening armored plates of cement production furnaces, manufacture of racks, metal products to order, manufacture of non-standard equipment, equipment for food, textile, tobacco, mining, processing industries, manufacture of equipment, metal structures, metal products, metal processing, milling, grinding.

2. Relevance and relevance of the EP

Modern trends in the development of production in the southern region of the Republic of Kazakhstan are defined in a number of successive programs of industrial and innovative development of our state. One of the important priority areas is the development of domestic engineering. The level of development of the machine-building industry is one of the important indicators of the state economy. As you know, mechanical engineering includes a number of sub-sectors, including such important for our region as metallurgy, welding and assembly, energy, lifting and transport, railway, tractor, agricultural, electrical, electronic and radio industries, as well as the automotive industry, which has received a powerful impetus. Therefore, the problem of personnel training for modern machine-building enterprises is very relevant.

The demand for EP 6B07124 – "Electrotechnical machinery and energy systems engineering", covering all branches of the national economy, is determined by the need of modern enterprises for specialists in the organization of design, production and technological, organizational and managerial, research, service and operational, installation and commissioning activities.

Graduates of the EP have high requirements both in terms of the level of general engineering training, and in the field of design and technological preparation of production, development of technological processes of welding production, as well as assembly processes, bench tests and equipment running-in. Due to the focus of the EP on obtaining relevant competencies by graduates, it will be in demand, especially in the coming years.

3. Learning outcomes and competencies, their relationship to the demands of the labor market

The results of the training are presented in all modules and components of the EP and are aimed at obtaining general and professional competencies by students. The competencies of the graduate in EP 6B07124 – "Electrotechnical machinery and energy systems engineering" meet the expectations and requirements of modern machine-building industries. I would especially like to mention such key competencies as:

- perform mathematical modeling of processes and objects based on standard computer-aided design and research packages;
- to use the organizational and legal foundations of management and entrepreneurial activity;
- to study the research of problems in the field of management and marketing and use the results obtained to improve the methods of enterprise management.

A modern enterprise, first of all, has to solve precisely the problems of automation of the production process and commercial activities. Therefore, the learning outcomes and competencies of graduates of the EP are very relevant.

4. Availability of components that develop practical skills

A number of components of the modules of the EP specialty are aimed at acquiring practical work skills by students. These are disciplines related to the design and manufacture of pumps and shut-off valves, the design of actuators in mechanical engineering, and as a result of mastering the disciplines, students gain practical skills.

6. Content of the educational program (modules, disciplines)

EP 6B07124 – "Electrotechnical machinery and energy systems engineering" is developed on the basis of a modular approach to the construction of a training program on EP. As a result of mastering each module, students acquire certain competencies. Disciplines are organized into modules in order to obtain certain professional competencies. The modules of the specialty include disciplines that meet the modern requirements of machine-building enterprises. It is particularly necessary to note such important areas as an automated process control system, automation of production processes of power engineering, mechatronic systems in mechanical engineering and their modeling.

7. Conclusion on EP

The educational program 6B07124 – "Electrotechnical machinery and energy systems engineering", developed at the M. Auezov SKU, fully meets the requirements of the state standard of higher education (bachelor's degree), as well as the requirements of modern machine-building enterprises of the Republic of Kazakhstan and world standards of machine-building enterprises. The modular

principle of EP construction and the competence approach allows students to gain in-depth professional knowledge, skills and abilities necessary for the operational adaptation of a specialist in the conditions of modern production.

Director of ShZ "Etalon" LLP _____ Kovalenko V.P.

REVIEW

for the educational program 6B07124 – "Electrotechnical machinery and energy systems engineering"

1. Brief description of the company and the profile of its activities

Medical equipment manufactured by KAZMEDPRIBOR Holding LLP is successfully used in the largest healthcare institutions in all regions of Kazakhstan. The company, which started its activity with a small workshop for the manufacture of medical furniture, today represents the largest plant of medical equipment in Kazakhstan.

The production of KAZMEDPRIBOR Holding LLP complies with international standards. The company has certificates of ST RK ISO 9001:2009, as well as ISO 13485:2003 "Medical devices", which allow exporting products to the CIS countries and the European Union.

The medical equipment plant produces more than 300 types of products: from simple pieces of medical furniture to high-tech modern equipment, such as ultrasound, X-ray machines, operating tables, medical consoles, electrocardiographs, operating lights and much more.

Medical and preventive institutions under construction include medical equipment of KAZMEDPRIBOR Holding LLP in their budget. This makes it possible to reduce costs without turning to foreign suppliers.

In addition, the Kazakh manufacturer of medical equipment is engaged in the assembly and equipping of ambulances, medical vehicles and mobile medical complexes. At the KAZMEDPRIBOR Holding LLP plant, cars of various codifications are successfully completed: for linear brigades, reanimobiles, dentomobiles, donor points, neonatal cars, sanitary vehicles.

2. Relevance and relevance of the OP

The educational program 6B07124 – "Electrotechnical machinery and energy systems engineering" is in demand in the Republic of Kazakhstan, provides for the development of the machine-building industry in the South Kazakhstan region.

The EP "Electrotechnical machinery and energy systems engineering" is focused on the preparation of bachelors of engineering and technology in the field of electrical engineering related to high-tech production and resource-efficient operation and innovative development of power engineering technology and technologies for conversion, production and consumption of energy.

The development of an economy focused on the Kazakh market, the need to transfer it to a new industrial level are one of the priorities of the education system and the provision of the machine-building industry with qualified production personnel with a high level of professional competence, able to independently formulate goals, set tasks and organize their qualitative solution.

To date, there are systemic problems in Kazakhstan's mechanical engineering industry associated with an insufficient level of investment attractiveness of the

industry, a low level of competitiveness of products in the domestic and foreign markets, a shortage of qualified personnel.

Ensuring the high quality of bachelor's degree preparation at the university increases the general culture, commitment, responsibility, sociability, diligence, tolerance and patriotism of graduates. The training of highly qualified personnel in the field of engine building allows a university graduate to work successfully in his chosen field of activity, contributes to solving professional problems. Mastering general cultural and professional competencies during the period of study at the university contributes to the social mobility of the graduate and his demand in the labor market.

3. Learning outcomes and competencies, their relationship to the demands of the labor market

The competencies of the graduate in 6B07124 – "Electrotechnical machinery and energy systems engineering " meet the expectations and requirements of modern machine-building industries. The educational program contains the results of training and competencies, namely:

- develop technical specifications for the design of special equipment, tools and devices provided by technology, technical specifications for the production of non-standard equipment, automation and mechanization; able to determine the order of work and the operational route of processing parts and assembling products;
- to choose the main and auxiliary materials and methods of implementation of the main technological processes and to apply progressive methods of operation of technological equipment in the manufacture of mechanical engineering products;
- to carry out and justify engineering projects for the creation of complex competitive mechanical engineering products and their production technologies, including using modern CAD/CAM/CAE products; to develop and implement control programs for machining parts
- design and construct various types of systems, engines and production devices, energy pumps, blocks and assemblies using computer-aided design tools;
- to carry out adjustment, adjustment and experimental verification of physical devices, systems and complexes.
- participate in the development of programs and methods of control and testing of power engineering products, technological equipment, diagnostics, automation and control, carry out metrological verification of measuring instruments of the main indicators of the quality of products, in the evaluation of its defects and analysis of the causes of its occurrence, the development of measures to prevent and eliminate it.

Students in this direction and training trajectories, in accordance with their qualifications, will be able to carry out professional activities in the field of design and design, research, installation, commissioning, operation and repair of energy machines, pumps, aggregates, installations and their control systems, which are based on various forms of energy conversion.

4. Availability of components that develop practical skills

The basic educational program of engineer training is developed on the basis of this state educational standard of a certified specialist and includes a curriculum, programs of academic disciplines, programs of educational and industrial practices.

All types of practices are provided for in the implementation of educational activities on the EP "Electrotechnical machinery and energy systems engineering".

In the programs of educational practice (practice for obtaining primary professional skills), industrial practice (including: practice for obtaining professional skills and experience of professional activity; research work); pre-graduate practice (practice for performing final qualifying work); – the goals and objectives of practice, practical skills, competencies are indicated, acquired by students. The location and time of the internship are indicated, as well as the forms of reporting on the practice. Practitioners consolidate the knowledge and skills acquired by students as a result of mastering theoretical courses, develop practical skills and contribute to the complex formation of general cultural (universal) and professional competencies of students.

The teaching staff of the Department of «Mechanics and Mechanical Engineering» is formed of highly qualified teachers with academic degrees and titles. The number and composition of teachers meets the educational objectives and covers all disciplines of the educational program. This circumstance makes it possible to adapt adequately to the increasing professional requirements.

5. Content of the educational program (modules, disciplines)

The main professional educational program of higher education in the field of training 6B07124 – "Electrotechnical machinery and energy systems engineering", is provided with educational and methodological documentation and materials for all training courses, disciplines of the educational program.

The content of the educational program 6B07124 "Electrotechnical machinery and energy systems engineering" defines a complete list of basic and specialized disciplines; provides the necessary integrity of the educational program, combining the fundamental nature of training with the interdisciplinary nature of the professional activity of a specialist; determines the ratio between the classroom load and the independent work of a bachelor; establishes a reasonable ratio between the theoretical and practical components of the content of education; the most effective types of training sessions and educational technologies from the point of view of achieving the set goals have been identified. The disciplines are coordinated with the specialists of KAZMEDPRIBOR HOLDING and are aimed at acquiring certain professional competencies.

6. The quality of the modular directory

The modular reference book of the educational program contains forms for describing each module, allowing students to familiarize themselves with its content, learning outcomes, the number of credits with the distribution of hours for the provided types of classes (lectures, practical, laboratory, SRS), prerequisites, post-prerequisites responsible for the module.

7. Conclusion on EP

In general, the educational program of higher education in the field of training 6B07124 – "Electrotechnical machinery and energy systems engineering " has a comprehensive and targeted approach for the training of a qualified specialist with certain professional skills and competencies necessary for further professional activity in the relevant field of training.

The introduction of new educational and information technologies into the educational process and the formation of a single virtual educational space are currently priority trends within the framework of the state programs "Digital Kazakhstan" and "Atlas of New Professions".

General manager
KAZMEDPRIBOR HOLDING LLP

Kanatbekuly K.

REVIEW
for an educational program
6B07124 – "Electrotechnical machinery and energy systems engineering"
developed at the M. Auezov SKU, Shymkent

1. Brief description of the company and the profile of its activities

Asia Trafo LLP is the largest transformer equipment manufacturing plant in Central Asia, which is part of the leading Kazakhstani manufacturer of electrical equipment Alageum Electric. The main products of the plant are power oil transformers and autotransformers of voltage class 110, 220, 500 kV with a capacity of up to 500 MVA, as well as reactors. The design capacity of the plant is over 12,000 MVA per year.

When designing our transformers, we use modern software developed by a group of Ukrainian developers "Soft-Team Group" formed on the basis of the world-renowned institute "All-Union Institute of Transformer Engineering". This software is based on the developments of leading experts in transformer engineering around the world, it takes into account aspects of 100 years of global experience in designing and operating transformers. Mathematical modeling programs include a complete package of electromagnetic, mechanical, thermal and dynamic calculations.

2. Relevance and relevance of the EP

The fastest growing branch of modern world engineering remains the electronic and electrical industry, whose share in all manufacturing products by the beginning of the 21st century had grown to 30-32%.

Electrical engineering is a branch of mechanical engineering that manufactures electrical products that produce, consume and transmit energy. The emergence of this industry dates back to the end of the 19th century (in the USA). At the beginning of the 20th century, electrical engineering began to gain momentum. Currently, the main centers of the electrical industry are countries such as Japan, the USA, Sweden, and Germany.

Electrotechnical industrial engineering is engaged in the production of large-sized electric machines, industrial electrical equipment, and components for them. Industrial products are used in all branches of mechanical engineering (agricultural, transport, etc.), such equipment as: batteries, electric motors, electric generators, electric welding machines, etc. It is worth noting that the production of electrical equipment contributes to the growth of labor productivity in almost all sectors of the economy and an increase in the pace of scientific and technological progress. The branch of electrical engineering requires highly qualified personnel, as well as placement in areas of high technical culture, in close proximity to institutes and laboratories.

Due to the demand for highly qualified personnel in this industry, the relevance of EP 6B07124 – "Electrical engineering and energy systems engineering" is beyond

doubt. Since the Department of Mechanics and Mechanical Engineering at the YSU named after M.Auezova works closely with regional companies – KarlskronaLCAB LLP, specializing in the production of pumping, electrical, non-standard equipment and shut-off valves and AsiaTrafo LLP, the largest transformer equipment manufacturing plant in Central Asia, which is part of the leading Kazakhstani manufacturer of electrical equipment Alageum Electric, together if the employer creates educational programs, then this serves as a guarantee for the employment of graduates of the EP.

1. Learning outcomes and competencies, their relationship to the demands of the labor market

The graduate's competencies in EP 6B07124 "Electrical engineering and energy systems engineering" meet the expectations and requirements of modern electrical engineering industries. The learning outcomes of the educational program are formed as follows:

- to carry out technological processes for the design and production of electrical and power equipment, to design new and modernize existing power plants, to provide technical guidance for power plants of various types;

- to expand the scope of application of the latest technologies and structural materials in mechanical engineering, reduce the launch time of new products, contribute to the growth of the need for the production of innovative products of domestic engineering, change consumer preferences and introduce, design and control industrial robots at machine-building enterprises;

- to design and design pumping equipment and systems taking into account the basic physical properties of liquids and gases, the laws of hydrostatics and hydrodynamics, strength, rigidity and stability of engineering structures and their elements;

- design schemes and methods of installation and commissioning and maintenance work, methods of organization, testing and maintenance of technological processes, operate and maintain pumps and their auxiliary equipment;

- to carry out design activities using special programs (CAD modeling, FEM modeling), information and digital technologies; to make and justify specific technical decisions when creating objects of electrical and power engineering.

The level of development of professional competencies determines the competitiveness of a specialist in the labor market as a professional who is able to apply the acquired knowledge in a specific practical situation in order to obtain the desired result at the lowest cost and in the optimal time.

2. The presence of components that develop practical skills

A number of components of the modules of the educational program are aimed at students acquiring practical skills in their specialty. The EP includes components that form professional competencies and develop practical skills – Design and manufacture of pumps and shut-off valves, Calculation and design of hydrodynamic machines, Calculation and design of pumping station equipment, Design of circuits and control equipment for pumping units, Automation of production processes of

power engineering, Installation and repair of pumps and pumping stations, Quality management of power engineering.

It is impossible to consolidate and deepen theoretical knowledge and professional competencies, as well as gain experience in independent professional activity without passing professional practice. The practice aims at the comprehensive development of all types of professional activities by students, the formation of general and professional competencies, as well as the acquisition of necessary skills and practical experience in the specialty. The EP provides for all types of practices on the basis of concluded contracts with practice bases. The goals and objectives of the practice at different stages of students' education differ from each other, but they are organically linked with other forms and methods of teaching. The practice is included in the training module with disciplines, the theoretical knowledge of which it is intended to consolidate.

3. The content of the educational program (modules, disciplines)

The content of the educational program is determined by the regulatory requirements of the Ministry of Education and Science of the Republic of Kazakhstan and the internal regulations of the University.

The educational program contains modules that form skills and competencies in the field of mathematical, natural, social and socio-economic sciences, modules of communicative mobility, which give competencies for studying the subject area in Kazakh, Russian and foreign languages, specialty modules that allow: to carry out engineering projects of high-tech electrical equipment using modern design methods to achieve optimal results. results, taking into account economic and environmental constraints; plan and perform numerical experimental studies, process and analyze the results, participate in tests of electrical engineering facilities; repair, install, service electrical equipment and power systems, diagnose the technical condition of complex components and mechanisms.

The disciplines are coordinated with the specialists of Asia Trafo LLP and are aimed at acquiring certain professional competencies.

4. The quality of the modular reference book

The modular reference book is a necessary component of the credit technology of education, which ensures the electability of the teacher and the learning trajectory. The modular handbook provides data on the teacher, on the distribution of credits, types of classes, module level, number of credits, form of study, prerequisites and post-prerequisites of the module, module content, learning outcomes, and the form of final control.

7. Conclusion on the EP

The educational program 6B07124 – "Electrical engineering and Energy systems Engineering" provides high-quality, advanced, multi-level education for all students and trains future design engineers and development engineers of electrical systems and tools, service engineers for electric drives and software controls, power engineers, etc.

Graduates of the program may have deep professional knowledge, skills to find non-standard solutions to professional problems, apply modern methods and means of research, design, technological preparation of production and operation of electrical equipment, possess modern measuring and computer systems and technologies, skills in design, presentation and protection of the results of solving professional problems.

General manager
«Asia Trafo» LLP

Asanov O.B.

Expert opinion

For the educational program «6B07124 – Electrotechnical machinery and energy systems engineering»

The relevance of the EP is due to the need to train specialists in the southern region of the Republic of Kazakhstan in the field of mechanical engineering, mechanics and metalworking for their implementation of strategic programs of industrial and innovative development of our state.

One of the important priority areas is the development of domestic engineering. Mechanical engineering includes a number of important areas, such as metallurgy, chemical, energy, lifting and transport, railway, automobile, tractor, agricultural, aviation engineering, electrical and radio industries. The problem of personnel training for modern machine-building enterprises is very relevant.

1. Compliance of the EP with the formulated goals consistent with the mission of the university, the requests of employers and students.

The OP corresponds to the goals formulated in it and is consistent with the mission of the M. Auezov SKU to train specialists in the field of machine building based on the use of achievements of science and technology, dynamism and advanced development of mechanical engineering.

The presented goals of the EP are formulated and concretized in the context of students' requests, as they are based on Dublin descriptors and are expressed through competencies: in the field of native language, foreign language, fundamental mathematical, natural science, technical, computer, educational, social (interpersonal, intercultural, civic), entrepreneurial, economic, cultural training, conducting scientific research, additional and professional competencies in the field of mechanical engineering.

2. Employers' requests are specified in order to reflect the possibilities of the EP to provide students with a solid training in the field of mechanical engineering, which will allow them to compete successfully in the labor market. «KARLSKRONA LC/AB» LLP, «ShZ Etalon» LLP, «Asia Trafo» LLP, «Electroapparat» LLP, «KAZMEDPRIBOR HOLDING» LLP took an active part in the development of the educational program.

3. Compliance with the National Qualification Framework of the Republic of Kazakhstan

The National Qualifications Framework contains eight qualification levels, which corresponds to the European Qualifications Framework and the levels of education defined by the Law of the Republic of Kazakhstan "On Education". The educational program «6B07124 – «Electrotechnical machinery and energy systems engineering» corresponds to the sixth level of qualifications of the NRC of the Republic of Kazakhstan and is necessarily coordinated with potential employers and students.

4. Reflection in the EP of learning outcomes and competencies based on Dublin descriptors embedded in professional standards/industry frameworks

The educational program contains learning outcomes and competencies based on Dublin descriptors, namely:

A. Knowledge and understanding;

B. Practical use of knowledge and understanding ability;

C. Ability to make judgments and formulate conclusions;

D. Communication skills;

E. skills in the field of education, taking into account the three levels of training (master's and doctoral studies), as provided by the terminology of the Bologna process.

The industry qualifications framework in mechanical engineering (project) undergoes the approval and approval procedure, from which the recommended job titles of graduates in the Mechanical Engineering specialty are included in the EP.

5. Compliance with the SMSE

The content of the educational program for the mandatory component in structure, content and volume fully complies with the State State Mandatory Standards of Higher and Postgraduate education, approved by Order of the Minister of Education and Science of the Republic of Kazakhstan dated July 2, 2022 No 2.

The volume of the cycle of compulsory general education disciplines is 8 credits, 8 credits are allocated for the mandatory component of the cycle of basic disciplines, 2 credits are allocated for the mandatory component of the cycle of profile disciplines. The volume of all types of practices is 9 credits. For the entire period of study, students master 240 credits.

According to the SES of higher and postgraduate education, the curriculum of the EP «6B07124 – Electrotechnical machinery and energy systems engineering» has been compiled, in which the total labor intensity is 240 credits.

The distribution of hours in the EP corresponds to the standard plan of the bachelor 's degree in technical specialties .

Thus, the EP «6B07124 – Electrotechnical machinery and energy systems engineering» was developed in accordance with the regulatory documents of the Ministry of Education and Science of the Republic of Kazakhstan, including standard curricula according to the rules of modular structuring, competence approach and taking into account the results of the development of modules and the entire modular curriculum in credits of the Republic of Kazakhstan and hours.

The curricula are based on the principles of continuity, continuity and adaptability, contain a list of disciplines, the number of credits, placement by semester, types of classes and forms of control. All disciplines of the curriculum assume study in semesters, taking into account the logical sequence based on prerequisites and post-prerequisites. There are 3 cycles of disciplines in the structure of the curriculum, distributed between the university and elective components. Along with this, the volume of credits, the terms of passing educational, professional and pre-graduate practice and the completion of the diploma project are reflected.

6. The structure and content of the EP, the application of the modular principle of their construction

A modular training system is implemented in the educational program «6B07124 – Electrotechnical machinery and energy systems engineering». It helps to solve the problems of systematization of knowledge, their best assimilation and consists in splitting information into certain doses – modules that determine the necessary controllability, flexibility and dynamism of the learning process. The module is not only a section of the educational program, but also a system based on the interaction of various methods and methods of educational activity that ensure the entry of this module into an integral learning system.

7. The presence of components in the EP for preparation for professional activity, developing key competencies, intellectual and academic skills, reflecting the changing requirements of society.

The EP is aimed at obtaining professional and general educational competencies, such as: general education, socio-ethical, economic and organizational-managerial, special and professional competencies, develops students' readiness to change social, economic, professional roles, geographical and social mobility in conditions of increasing dynamism of changes and uncertainties.

8. Logical sequence of disciplines and reflection of basic requirements in curricula and training programs.

The sequence of modules and disciplines in the EP is logically justified, the principles of ensuring continuity, continuity, accessibility and consistency of the content of education in curricula and training programs are implemented

9. Reflection in the EP of the system of accounting for the academic load of students and teachers in loans, its compliance with the parameters of the credit system of education.

The EP reflects the system of accounting for the academic load of students and teachers in credits, through the formation of a summary table, reflecting the volume of credits mastered in the context of modules of the educational program and in the content of disciplines, including the number of credits for its development.

10. The presence of research practice in the programs to consolidate theoretical material expressed in the academic load in credits.

The EP has a section «Providing professional practices»: their types, the main typical places of organization and conduct, evaluation of results", which reflect the goals, objectives and results of practices for students. In the EP, the academic load in credits is shown in a summary table reflecting the volume of practice credits mastered in the context of the modules of the educational program.

11. Information about the teaching staff involved in the implementation of the EP

Information about the teaching staff involved in the implementation of the EP is reflected in the modular form describing each component of the module, responsible for which are candidates and doctors of sciences, PhD doctors.

Qualification obtained as a result of mastering the EP – Bachelor of Engineering and Technology in the educational program «6B07124 – Electrotechnical machinery and energy systems engineering».

12. Recommendation. The above shows that the educational program «6B07124 – Electrotechnical machinery and energy systems engineering», prepared at the M. Auezov SKU, has been developed at a high professional level and can be recommended for use in the organization of the educational process of education of the 6th level of the National Qualifications Framework of the Republic of Kazakhstan.

Chairman of the Expert Commission: Abzalova D.A.

Members of the expert commission: Kaldybaeva B.M.

Zhantasov M.K.