

Drafters:

MINISTRY OF SCIENCES AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN

M.O. AUEZOV SOUTH KAZAKHSTAN UNIVERSITY

Chairman of the Board
Rector
Doctor of historical sciences,
Academician, Kozhamzharova D.P.



EDUCATION PROGRAMME

7M07120 - MACHINE ENGINEERING

Registration Number	7M07100017
Code and classification of Education	7M07 Engineering, Manufacturing and Civil Engineering
Code and Classification of Areas of Training	7M071 Engineering and Engineering Trades
Group of Educational Programs (EP)	7M103 Mechanics and Metal Working
Type of EP	Current
ISCE level	7
NQF level	7
IQF level	7
Language learning	Kazakh, Russian
The complexity of EP	120 credits
Distinctive Features of EP	-
Partner University (JEP)	-
University Partner (DDEP)	-

Shymkent, 2023

Drafters:

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The EP was considered in the director of training «Engineering and Engineering business» at a meeting of the academic committee, Minutes # 4 «24» 01 2023.

Chairman of the Committee _____ Ayturayev M.Zh.

The EP was considered and recommended for approval at Educational-methodical meeting of M. Auezov SKU, Minutes # 4 «22» 02 2023.

Chairman of the Meeting _____ Abisheva R.

The EP was approved by the decision of the Academic Council of the University, Minutes # 13 from «23» 02 2023.

CONTENT

1.	EP concept	4
2.	Passport of the educational program	5
3.	Competences of the graduate of EP	7
3.1	Matrix of correlation of EP learning outcomes in general with modules formed by competencies	9
4.	Matrix of the influence of modules and disciplines on the formation of learning outcomes and information on labor intensity	10
5.	Summary table on the volume of loans disbursed in the context of EP modules	25
6.	Learning strategies and methods, monitoring and evaluation	26
7.	Educational and resource support of the EP	27
8	Approvalsheet	29
9	Appendix 1. Review from the employer	30
10	Appendix 2. Expertopinion	33
11	Appendix 3. Professional Standard «Quality Management»	37

1. CONCEPT OF THE PROGRAM

University Mission	We are aimed at generating new competencies, training 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"> • Orientation to the regional labor market and social order through the formation of professional competencies of the graduate, adjusted to the requirements of stakeholders • Practical orientation and emphasis on the development of critical thinking and entrepreneurship, the formation of a wide range of skills that will allow to be functionally literate and competitive in any life situation and be in demand in the labor market • Independence in setting and solving tasks of professional, scientific, innovative and pedagogical 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 Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2; 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 educational programs (EP) for persons with disabilities and special educational needs(SSN)	<p>For students with SEN (special educational needs) and persons with disabilities (PSI), tactile PVC tiles, specially equipped toilets, a mnemonic diagram, and shower bars have been installed in educational buildings and student dormitories. Special parking spaces have been created. Crawler lift installed. There are desks for people with limited mobility (PLM), signs indicating the direction of movement, ramps. In the educational buildings (main building, building No. 8) there are 2 rooms with six working places adapted for users with disorders of the musculoskeletal system (DMS). For visually impaired users, the SARA™ CE Machine (2 pcs.) is available for scanning and reading books. The library website is adapted for the visually impaired. There is a special NVDA audio program with a service. The JIC website http://lib.ukgu.kz/ is open 24/7.</p> <p>An individual differentiated approach is provided for all types of classes and in the organization of the educational process.</p>

1. PASSPORT of the Educational program

Purpose of the EP	Preparation of masters with professional skills in the implementation, organization and conduct of scientific research, pedagogical activity, with conceptual knowledge in the field of technology, technology, fluent in state and foreign languages, demonstrating the skills of conceptual analytical and logical thinking, able to determine the strategy and plan the activities of the organization, make decisions and be responsible at the level of the position.
Tasks of the EP	<ul style="list-style-type: none"> - providing conditions for acquiring a high intellectual level of development, mastering logical and critical thinking and skills of the scientific organization of labor in scientific and pedagogical activities in the field of higher education and modern industries; - development of the ability to use the acquired knowledge in professional activities for solving scientific, managerial and technological problems, for prompt decision-making in problem situations; - development of skills of self-study and continuous professional development throughout their professional activities, which will allow masters to successfully adapt to changing conditions; - the formation of the competitiveness of graduates in the field of higher education and modern machine-building and mechanical assembly industries, to ensure the possibility of their fastest possible employment in their specialty or continuing their studies in doctoral studies.
Harmonization of EP	• 7 th level of the National Qualifications Framework of the Republic of

	<p>Kazakhstan;</p> <ul style="list-style-type: none"> • Dublin descriptors of the 7th level of qualification; • 2 cycle of a Framework for Qualification of the European Higher Education Area); • 7thLevel of European Qualification Framework for Life long Learning).
Connection of the EP with the professional sphere	<ul style="list-style-type: none"> • Industry qualification framework for the "Mechanical Engineering" industry, (approved by the Protocol of the Meeting of the Sectoral Commissions on Social Partnership and Regulation of Social and Labor Relations for the mining and metallurgical, chemical, construction and woodworking, light industry and mechanical Engineering on August 16, 2016, Protocol No. 1). • Professional standards "Engineering and metalworking" (Appendix No. 13 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of Kazakhstan "Atameken" No. 269 of December 30, 2019). • Atlas of new professions and competencies in the Republic of Kazakhstan https://www.enbek.kz/atlas/.
Name of the degree awarded	The degree of Master of Technical Sciences is awarded according to the educational program "7M07120 – Machine Engineering"
List of qualifications and positions	Masters by EP "7M07120 - Machine Engineering" can hold primary positions: Research Fellow, Director (CEO, Executive Director, President, Chairman of the Board, Managing Director) of the organization, Chief Engineer, Chief Designer, Chief Metallurgist, Chief Technologist, Deputy Director (Director, Vice President) for Production, Deputy Director for General Issues (Administrative Director), Master Control (site, workshop), Master Site, Head (Head) of the workshop, Head of Tool Department, Head of Research Laboratory, Head of Production Department laboratory (production control), Head of Laboratory (Bureau) for Labor Management and Production Management, Head of Automation and Mechanization of Production Processes, Head of Equipment Completion, Head of Quality Control, Head of Marketing, Head of Production Department, Head of Repair Department, Head of Shifts, Head of Equipment Maintenance, Head of Welding Services, Head of Technical Department, Head of Central Factory Laboratory, Head of Workshop (Section), Head of Experimental Production Shop, Project Manager, University Teacher in (research institutions, design and design organizations) without making requirements for work experience in accordance with the qualification requirements of the Qualification directory of positions of managers, specialists and other employees, approved by order of the Minister of Labor and Social Protection of the Republic of Kazakhstan from December 30, 2020 No. 553..
Field of professional activity	Educational process, production, commercial and financial business related to mechanical engineering, determining the need for specialists in training, planning for the creation and reconstruction of production facilities, ensuring the production process at enterprises, designing, designing and manufacturing of competitively capable mechanical engineering products.
Objects of professional activity	Industrial enterprises, public administration bodies, universities and research institutions, institutions of state and non-state profile, including industry, agriculture and utilities, the military-industrial complex, production and consumption.
Subjects of professional activity	Educational, production, 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 related to ensuring continuous operation of production.
Types of professional activity	Scientific research, experimental research, pedagogical, design, production and technological, organizational and managerial, design and technological.
Learning outcomes	<p>LO1 Demonstrate foreign language skills in interpersonal communication, professional activity, writing scientific articles.</p> <p>LO 2 To analyze the main ideological and methodological problems, including interdisciplinary ones, arising in science at the present stage of its development, to evaluate various facts and phenomena based on the provisions and categories of the philosophy of science.</p> <p>LO 3 Apply the methodology of scientific research, effective teaching methods in the field of technical disciplines, critically assessing the scientific organization of the work of a higher school teacher, and using methods of activating the activities of students.</p> <p>LO4 Effectively manage projects, making operational management and technical decisions in non-standard situations of professional activity, demonstrating skills of professional growth.</p> <p>LO5 To manage the production process, including the design and manufacturing processes of the equipment of the machine-building complex, justification of optimal production modes, testing and quality control of products.</p> <p>LO6 To develop and test new approaches to design, research, inventive, innovative activities in various branches of mechanical engineering.</p> <p>LO7 Apply additive technologies and technical means, taking into account the possibilities and rules of operation of computer-measuring control systems, the main technological parameters of 3D printing.</p> <p>LO8 Perform analytical work with the involvement of information resources; summarize the results in the form of reports, reports and scientific articles.</p> <p>LO9 Analyze problems in interdisciplinary related fields of knowledge, demonstrating the skills of independent experimental research, justifying the results of research when discussing with specialists and a wider audience.</p> <p>LO10 Perform technological calculations based on the latest achievements in the field of technological processes of metalworking and mechanical engineering, mathematical and physical modeling of technological systems and equipment of the machine-building complex.</p>

3. COMPETENCES OF THE GRADUATE OF EP

SOFT SKILLS. Behavioral skills and personality qualities	
SS1. Competence in managing one's own literacy	<p>SS1.1. The ability of self-learn, self-develop and constantly update their knowledge with in the chosen trajectory and in an interdisciplinary environment.</p> <p>SS1.2. The ability to express thoughts, feelings, facts and opinions in the professional field.</p> <p>SS1.3. The ability for mobility in the modern world and critical thinking.</p>
SS2. Language competence	<p>SS2.1. The ability to build communication programs in the state, Russian and foreign languages.</p> <p>SS2.2. The ability for interpersonal social and professional communication in the conditions of intercultural communication.</p>
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,	SS4.1. The ability to demonstrate and develop information literacy

<p>technological literacy</p>	<p>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.</p>
<p>SS 5. Personal, social and academic competencies</p>	<p>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.</p>
<p>SS 6. Entrepreneurial competence</p>	<p>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 source and manage your time. SS6.3. The ability to work with consumer requests.</p>
<p>SS 7. Cultural awareness and ability to expressly our self</p>	<p>SS7.1. The ability to show worldview, civil and moral positions. SS7.2. The ability to be tolerant of the traditions and culture of other peoples of the world, to have high spiritual qualities.</p>
<p>HARDSKILLS</p>	
<p>Theoretical knowledge and practical skills specific to this field</p>	<p>HS1. The ability to apply the principles of constructing images and drawing of geometric objects; rules for registration of design documentation in accordance with ISO, ESKD / ESTD. To be able to perform calculations, design and graphically present information about processes and objects; HS 2. The ability to design the technological process of processing blanks, to carry out design developments and to justify the selected technological solutions; to know and use the capabilities and rule of operation of computer measuring systems for monitoring the main technological parameters of 3D printing; HS 3. The ability to solve problems in professional activities in the field of mechanics and metal working, to conduct a qualitative analysis; to design technological equipment, method of basing the workpieces, to apply the use of universal assembly devices, to present the principal schemes of the main equipment, tools, accessories, to independently choose the optimal technology and equipment for the production of welded structures; HS 4. The ability to apply teaching methods in the field of technical disciplines, to critically evaluate the scientific organization of the work of a teacher of higher education, to use methods to enhance the activities of students; own professional terminology in English; HS 5. The ability to implement the results of scientific research, to master the methods of designing robotic systems, highly loaded machine part and the implementation of technological processes of mechanical and heat treatment, to solve basic metric and positional problems and layout solutions on the drawings.</p>

3.1 Matrix of correlation of EP learning outcomes in general with modules formed by competencies

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
SS1	+	+			+			+	+	+
SS 2	+	+								+
SS 3						+	+	+		+
SS 4				+	+		+	+		
SS 5	+	+	+	+	+		+			
SS6					+	+		+	+	
SS7		+	+						+	
HS 1		+		+		+		+		
HS 2	+	+		+		+			+	+
HS 3	+		+	+	+	+	+	+		+
HS 4		+			+		+		+	
HS 5	+	+		+	+			+	+	+

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

№	Module name	Cycles	HSC/EC	Component Name	Brief course description	Number of credits	Generated learning outcomes (codes)											
							LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10		
1	Module of Scientific and Pedagogical Training	BD	UC	History and Philosophy of Science	<p>Purpose: To study the problems of the phenomenon of science as a subject of special philosophical analysis, the patterns and trends in the development of special activities for the production of scientific knowledge, taken in a sociocultural context.</p> <p>Contents: Identification of the specifics and interrelationships of the main problems of the history and philosophy of science. The study of the laws of development of science and the structure of scientific knowledge, methods of scientific research. Knowledge of the main concepts and directions of the non-classical and post-non-classical stages of the development of science. Analysis of the realities of modern theory and practice based on the understanding of the methodology of the natural sciences, socio-humanitarian and technical knowledge. Critical thinking as a prerequisite for the development and functioning of modern society. Technologies for the development of critical thinking; consideration and study of the logic of arguments. Formation of critical reflective thinking and metacognitive abilities.</p>	4		v	v									
2		BD	UC	Foreign Language (Professional)	<p>Purpose: The goal is a systematic deepening of communicative competence within the framework of international standards of</p>	4	v											v

				foreign language education based on the further development of skills and abilities of active language proficiency in the professional activities of the future undergraduate. Content. Levels B2, C1 are presented in the form of a pragma-professional orientation for professional and academic purposes at an advanced level: scientific information base, interpretation of scientific information, argumentation, persuasion, scientific controversy, academic writing. Use of innovative methods and technologies, and attraction of modern means (Internet resources). Demonstration of knowledge of language material in any related discipline.											
3		BD	UC	Psychology of Management Purpose: to ensure the competence of a psychologist by mastering his knowledge in the field of psychological management, developing skills in managing the organization's human resources. Contents: methodological foundations of management psychology. Development of psychological theories of management. General theoretical questions of management psychology. Psychology of managerial communication. Psychological characteristics of the staff. Psychology of employee motivation. Technologies of human resource management of the organization. Psychological support of the personnel policy of the organization. Psychology of conflict in the organization. Technologies for preventing professional deformation of personality. Practical implementation in the form of creating diagnostic tools, developing	4				v	v					

					digital methods for training leaders, and management consulting.												
4	Methodical Bases of Teaching	BD	UC	High School Pedagogy	<p>Purpose: formation of the foundations of the professional and pedagogical culture of a university teacher, general pedagogical competencies, familiarization of undergraduates with the theoretical and methodological foundations of higher school pedagogy, technologies of planning, organization and management of the educational process at the university.</p> <p>Contents: Modern paradigms of education, history and the latest trends in the development of higher professional education in the world and in Kazakhstan. Genesis and methodology of higher school pedagogy, competence of a university teacher. Problems of university didactics, problems of organization of educational work with students, management of a modern university. Modern approaches and methods of teaching and organization of students' learning activities, assessment of academic achievements.</p>	4		v	v								
5		PD	UC	Methods of Teaching Engineering Disciplines	<p>Purpose: to acquire the skills of organizing the educational process of teaching technical disciplines</p> <p>Contents: General issues of teaching methods of engineering disciplines of higher education. Tasks and content of higher education. General didactic principles of teaching in relation to the system of higher education. Higher education system. Basic organizational forms of higher education. Structure and types of higher education classes. Methods of higher</p>	5			v								

					education. Innovative technologies in higher education. Planning of educational work and preparation of a teacher of vocational training for classes. Educational and material base of higher education. Control, assessment of knowledge, skills, and accounting for the progress of students.												
6		PD	UC	Pedagogical Practice	<p>Purpose: the formation of practical teaching skills in higher education.</p> <p>Contents: Preparation of documents on the organization of classes, preparation for classes and conducting classes using methods of activating students. Setting up and laboratory work of workshops, acquiring skills in conducting training sessions, applying new educational technologies, managing students' research work.</p>	4			v			v					
7	Research Methodology	PD	EC	Qualimetry in Mechanical Engineering	<p>Purpose: the formation of knowledge of the quality assessment of engineering objects, its quantitative expression and the use of the results obtained to solve the problems of quality management, certification and certification of products.</p> <p>Content. The history of the emergence of qualimetry. Principles of qualimetry. Objects of qualimetry. Theory of qualimetry. Methods for assessing product quality. Quality management in an organization. Quality control. Defectiveness and quality index. Nomenclature of quality indicators of industrial products. Problems of qualimetry of technical indicators.</p>	4		v			v						
8		PD	EC	Technical	<p>Purpose: to master the methods of designing</p>							v	v				

				systems modeling	technology for the production of machines. Contents: the basic concepts of the technology of production of parts, assemblies and assembly of machines. Determination of the type of production. Requirements for technological processes. Methodology of technological process development. Automation of technological process design. Dimensional analysis of technological processes. Design of standard and group technological processes. Modular technology for manufacturing parts. Classification of technology elements. Automated systems of classification, grouping and design of technological processes. Feasibility study of the effectiveness of the selected technological process.										
9		BD	EC	Systems of Management in Mechanical Engineering	Purpose: to give undergraduates knowledge of control systems in mechanical engineering, the laws of the flow of technological processes, the identification of those parameters, the impact on which is most effective for managing and intensifying production. Contents: Composition and classification of ESKD, ESTD standards and organization of production, classification features of machine shops, designations of technological documents, rules for developing approval, storing documentation. Information processing systems, Application of flexible production systems and modules (FPS, FPM). Management systems for machine-building enterprises.	4				v	v				

10		BD	EC	Computer-aided Design Engineering Products	<p>Purpose: to acquire computer-aided design skills of machine-building industry enterprises.</p> <p>Contents: Computer-aided design: a systematic approach to design. International CAD classification. Stages of designing complex products. Integrated CAD systems. Levels of designing complex products. Economic efficiency of computer-aided design. Methods of synthesis and evaluation of design decisions, decision-making; principles of optimal decision-making, mathematical methods of multi-criteria optimization, methods of expert assessments, optimality criteria. Project Management Systems (PDM).</p>							v			v
11		BD	EC	Process of Forming and Tools	<p>Purpose: to acquire the skills of designing and operating modern cutting tools.</p> <p>Contents: purpose and classification of cutting tools. The specifics of metal-cutting equipment. Technological methods of production of blanks. Methods of mechanical processing of surfaces of machine parts Metal cutting. Metal-cutting machines. Production of standard parts on machine tools. The study of relationships and patterns (mechanical, electromechanical, physical and technical processes, as well as dimensional, informational, economic, etc.) in order to create and improve technological processes of processing and the corresponding tool.</p>	6						v		v	

12		BD	EC	Processing of New Construction Materials	<p>Purpose: to teach the undergraduate to solve in the future many practical issues related to scientific and technical progress in various fields of technology, modern progressive methods of production of metals, new structural materials.</p> <p>Contents: structural materials and their classification. New construction materials and their properties. light alloys. Materials for mechanical structures. Conductor materials. magnetic materials. dielectric materials. Information about ceramic materials. Types of ceramic materials. ceramic composites. Production, molding and joining of ceramic materials. Fibrous, particulate-filled and foamed composites. Composites with a metal matrix. Composites with polymer and carbon matrices</p>						v			v	
13		PD	EC	Organization and Planning Researches and Innovation Trades	<p>Purpose: to acquire the skills of conducting research and innovation activities, to master the methods of experimental work and work with scientific and technical literature.</p> <p>Content: the importance of research and innovation activities in industrial enterprises, research institutes and design organizations. Basic concepts and definitions of the theory of planning and organization of scientific, pedagogical and innovative activities. Economic efficiency of forecasting, programming of scientific research. Place of organization and planning in the creation of progressive technology and technology. Target programs as an important link in the long-term plan of scientific and practical activities. Program-target planning in</p>	5		v			v				

				scientific and practical activities. Information base and tasks of substantiation of targeted programs. Experimental studies. Forecasting methods														
14		PD	EC	Development of New Products	<p>Purpose: to master the methods of organizing the production of new products at enterprises, to learn how to develop plans for the technological preparation of production during the reconstruction and commissioning of new workshops.</p> <p>Contents: System engineering of production preparation in mechanical engineering. Out-of-factory pre-production systems (TPP). Functional simulation of R&D and design pre-production. The procedure for conducting experimental design work. Services, departments and bureau of technological preparation of production. Systems of technological preparation of production capacities of enterprises. Technological analysis of production. Organizational preparation of production. Management requirements for organizational preparation of production. Production restructuring.</p>												v	v
15				Research Practice	<p>Purpose: familiarization with the latest theoretical, methodological and technological achievements of domestic and foreign science, with modern methods of scientific research.</p> <p>Content: Practical study of the latest theoretical, methodological and technological achievements of domestic and foreign science. Modern methodology of scientific research; analysis of the state of development of mechanical engineering in the world and Kazakhstan; the role of science and innovation</p>	6		v	v				v					

					in the improvement and modernization of technology; modern trends in the development of engineering technology. Study of the most urgent problems of engineering technology, the production of modern equipment and machines. Performing theoretical and experimental research on the topic of the dissertation.												
16	Modern Technological Processes and Production	BD	EC	Technology and Equipment for Mechanical and Physical-Chemical Treatment	Purpose: to acquire an understanding of the technologies and equipment for mechanical and physical-technical processing. Contents: Modern methods of material processing by cutting and physical and technical methods. The physical basis of tool wear. Physical and technical methods of processing. Manufacturing of a part by removing a layer of material from the workpiece as a result of all possible types of exposure in mechanical, thermal, electrical and chemical environments and their combinations. Electron beam processing and laser processing, principles of operation and physical circuits, installations, applications.	5					v						v
17		BD	EC	Development of Technological Processes for the Manufacture of Parts on CNC Machines	Purpose: Mastering the processing methods and technology of program control of machine tools in the processing of materials by cutting. Contents: Organization of management and preparation of technological equipment for machining centers. Tooling for CNC machines. Specifics of technological transitions for turning machining centers. Tooling for turning machining centers. Specifics of technological transitions for milling machining centers. Machine and tool equipment for milling machining centers.					v							v

					Specifics of technological transitions for CNC machines												
18		PD	EC	Modern Technological Processes in Mechanical Engineering	<p>Purpose: acquisition of knowledge of the ability to use modern technological processes of mechanical processing, welding and assembly industries.</p> <p>Contents: Problems of modern mechanical engineering. Modern technologies of metal forming. Various classes of welding. Automatic laser cutting for metal cutting. Technology of metal cutting. Machine tools used in flexible manufacturing systems. Principles of aggregation of machine tools. Automated control of machines. Multipurpose machines and machining centers. Methods for controlling the accuracy of processing on machining centers. Manufacture of products from non-metallic materials.</p>	6				v	v						
19		PD	EC	Modern Technologies and Equipment for Welding Production	<p>Purpose: to study modern technologies and equipment of welding production and acquire skills in applying the methods of designing the technological process of welding production.</p> <p>Contents: Physical basis of arc welding. Arc welding in shielding gases and submerged arc welding. Electro slag welding. Electron beam welding. Laser welding. Equipment for laser welding. Spot contact welding. Seam contact welding. Relief welding. Butt welding. Cold welding. Diffusion welding. ultrasonic welding. Friction welding. Roll welding. Thermo compression welding. Explosion welding. High frequency welding. Magnetic pulse welding.</p>			v									v
20	Machine Design	PD	EC	Reliability and Durability of	<p>Purpose: formation of basic knowledge on the analysis of the reliability and durability of</p>	6					v						v

	Methods			Machines'	equipment, the main directions for improving their reliability indicators at the stage of design, manufacture, operation of equipment. Content. The main indicators of reliability and durability. Physical bases of the theory of reliability. The physics of failures. Failure distribution laws. Depreciation of machines and mechanisms. Destruction mechanics. Friction and lubrication. Technological methods for ensuring reliability. System redundancy. Quality and reliability. Reliability tests. Machine diagnostics.											
21		PD	EC	Nanostructured Coatings and Coating Technologies	Purpose: formation of knowledge about the physics of the deposition process and film growth; relationship between the physical properties of thin films and coatings and their structural features; methods of formation of nanostructured coatings and films. Content. Regularities and processes of formation of thin films. Materials of thin films and nanostructured coatings. Growth of films from nuclei to a continuous coating. Layer-by-layer and spiral growth of films. Methods for obtaining nanostructured coatings. Thermal vacuum spraying. Application of nanostructured carbon coatings. electrolytic deposition. Magnetron sputtering of metals Coating equipment and modes. Study of the structure of coatings and their defects.						v					v
22		PD	EC	Machine Design Methods	Purpose: Formation of modern ideas on the design and construction of machines and structures that give the greatest economic effect and have high technical, economic and operational performance.	5						v				

					Content: Machine design, methodology, tasks. Stages of machine development. Search for ideas and design principles. Traditional and modern design methods. Elements of the theory of reliability and tribology. Calculation of models for tension-compression, torsion, bending and at variable stresses. Criteria for calculating machines and the theory of elasticity. Design calculations of joints and mechanical transmissions. Selection of bearings.											
23		PD	EC	Techniques for Designing Assembly Technology	Purpose: to gain skills in assembly design methods and assembly technology in serial and mass production. Contents: Forms of organizing assembly work. Non-flow stationary and mobile assembly. Fundamentals of the theory of basing, base modeling. Methods for achieving machine accuracy indicators. Typical and group technological assembly processes. Design of assembly production technology. Technology and equipment for assembling typical machine units. Assembly of mechanical gears. Assembly of connections with guide surfaces. Automation of assembly operations.				v							v
24		PD	EC	Design of the Automated Plant Site and Shops	Purpose: formation of knowledge and skills in the field of mechanical engineering for the design of automated sections and workshops, the ability to carry out calculations of individual subsystems, develop optimal structure options. Contents: Features of the manufacture of machines and their parts, the use of automated technological processes and innovative	6				v						v

				technologies of mechanical engineering. Methods for designing automated sections and workshops. Feasibility study for the use of automated sections and workshops, various system options. Automation of the design of technological processes. Modular technology for manufacturing parts. Automated systems for classification, grouping and design of technological processes													
25		PD	EC	Technological Processes of Additive Production	<p>Purpose: the formation of practical skills in the design of technological processes based on modern software products.</p> <p>Contents Additive technological machines and complexes. Manufacturability of the design of parts, assemblies and machines. Requirements for an additive manufacturing process. 3D modeling as a tool for computer simulation of the technological process. Software and hardware for additive manufacturing; selection of materials, print parameters and its optimization. Practical application of the programs Compass 3D, Compass-auto project, SOLIDWORKS and others for the development of the technological process additive manufacturing.</p>								v			v	
26		PD	EC	Fracture Mechanics	<p>Purpose: Formation of knowledge about the phenomena of the process of destruction, mathematical modeling of this process, concepts and methods of the mechanics of destruction of materials.</p> <p>Contents: Types and stages of destruction of machine parts. Linear fracture mechanics. Types of cracks. Mechanisms of crack initiation. CIN. Mechanics of elasto - plastic fracture. Fracture resistance. Ductile and</p>	5							v			v	

					brittle fracture. Fracture mechanics under creep conditions. Damage parameter. Fatigue Fracture Mechanics. High-cycle and low-cycle fatigue. Fatigue cracks and the effect of creep on their growth.													
27		PD	EC	Design Preparation of Production	<p>Purpose: studying the methods of designing machines and acquiring the skills of design training for the development of new products.</p> <p>Contents: The main tasks and stages of design preparation of production. The main ways to improve productivity. Economic efficiency and progressiveness of new technology. Measures to increase labor productivity and production efficiency. Technical preparation of automated production. Efficiency of accelerating technical preparation and mastering the production of new equipment. Methods for accelerating design preparation. The main directions of accelerating the technological preparation of production.</p>													
28		PD	EC	Operating Systems of Additive Production	<p>Purpose: formation of professional competencies in the design and development of additive manufacturing technologies.</p> <p>Content: Methodology of designing additive technological machines and complexes. Manufacturability of equipment and requirements for additive manufacturing process. Construction of 3D computer objects based on tomographic data. Methods of contactless shaping and photogrammetry, methods of computer modeling. Software and technical means of additive manufacturing; selection of materials, printing parameters and</p>	5		v										

					its optimization											
29		PD	EC	Innovative Processes of Digitalization of Mechanical Engineering Production	<p>Purpose: acquisition of computer modeling skills and application of computer technologies.</p> <p>Content: Application of systems computer-aided design (CAD) in mechanical engineering. Modern technological processes and technologies. Additive technologies and technical means. Modeling of technical systems. Complex information model and integrated information environment used in CAD systems.</p> <p>Promising areas of development of computer technologies and industrial systems, virtual engineering. Application of CALS technologies in machine-building production.</p>				v			v				
30	Module of research work and Final Certification	PD	EC	Research Work of a Master Student	<p>Purpose: Acquisition of skills for conducting scientific research and obtaining results for a master's thesis.</p> <p>Content: Analytical review of well-known design and technological solutions, selection and justification of the technological scheme of production in accordance with the topic of the thesis. The use of information technology and computer programs in the design and development of technological processes for the manufacture of mechanical engineering products. Determination of the economic efficiency of design and technological solutions. Formation of conclusions, modeling, processing and interpretation of the results.</p>	24	v	v	v			v	v	v	v	v
31				Execution and Defense of	<p>Purpose: To present and defend a dissertation in accordance with the topic of the dissertation and the requirements for them.</p>	8	v	v	v	v	v	v	v	v	v	v

				Master's Thesis	<p>Content: When performing, formalizing and defending a master's thesis, the undergraduate demonstrates knowledge about the current state, problems and prospects of the development of mechanical engineering, the development of methods of theoretical and experimental research, processing, analysis and generalization of results, the use of computer programs for modeling static and dynamic processes, for design and competent presentation scientific and design products. Master's thesis defense.</p>													
						120												

**5. SUMMARY TABLE ON THE VOLUME OF LOANS DISBURSED IN THE
CONTEXT OF EP MODULES**

Course of Study	Semester	The number of mastered modules	The number of studied disciplines		Number of KZ credits					Total hours	Total KZ credits	The number of	
			HSC	EC	Theoretical training	Pedagogical practice	Research practice	Research work of a master student	Final examination			exam	dif. test
1	1	3	5	2	29	-	-	1	-	900	30	6	2
	2	4	-	4	22	4	-	4	-	900	30	4	2
2	3	3	-	2	11	-	6	3	-	600	20	2	2
	4	2	-	3	16	-	-	4	-	600	20	3	1
	5	5	-	-	-	-	-	12	8	600	20		
Total			5	11	78	4	6	24	8	3600	120	15	7

6. LEARNING STRATEGIES AND METHODS, MONITORING AND EVALUATION

Learning strategies	Student-centered learning: the student is a center of teaching/learning and an active participant in the learning and decision-making process. Practice-oriented training: focusing on the development of practical skills.
Teaching methods	<ul style="list-style-type: none"> • Conducting lectures, seminars, various types of practices with: • using innovative technologies: <ul style="list-style-type: none"> • problem-based learning; • case study; • work in a group and creative groups; • discussions and dialogues, intellectual games, olympiads, quizzes; • reflection methods, projects, benchmarking; • Bloom's taxonomies; • presentations; • rational and creative use of information sources: <ul style="list-style-type: none"> • multimedia training programs; • electronic textbooks; • digital resources. <p>Organization of independent work of students, individual consultations.</p>
Monitoring and evaluation of the achievability of learning outcomes	<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 academic discipline; • control works; • protection of independent creative works; • discussions; • trainings; • colloquiums; • essays, etc. <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 examination; • written exam; • combined exam; • protect of practice reports.. <p>Final state certification.</p>

7. EDUCATIONAL AND RESOURCE SUPPORT OF THE EP

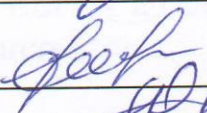
<p>Information Resource Center</p>	<p>The university has a unified system of library and information services. The total area of the scientific library is 2917.18 m², including the area of the book depository – 101.1 m². The library fund is replenished by 200-300 copies .new publications, for which 400-600 thousand tenge is allocated. The unified information and library fund is 2440639 copies, including 1523820 copies in the state language. all types and types of publications. Electronic access to library resources is provided via the university's website page http://www.asu.ukgu /, which presents:</p> <ul style="list-style-type: none"> - electronic library catalog; - electronic library; - personal indexes of the works of scientists; - bibliographic indexes and lists; - acquired information resources; - new arrivals; - list of periodicals issued by the library, etc. <p>The library page on the website is regularly updated. Access is organized from the university's website and Educational Portal.</p>
<p>Material and technical base</p>	<p>The material and technical base of the university currently consists of: three academic buildings, which house a library, reading and subscription halls, laboratories, specialized classrooms and classrooms, which are equipped with modern technical training facilities. All computer classes are equipped with new generation computers and LCD monitors, connected to a local network and connected to the Internet, the services of which all employees and undergraduates use for free and without time limit. University departments are equipped with computers, printers, audio-video equipment. Interactive whiteboards, multimedia projectors, panoramic screens are available for classes. The University has a sufficient sports base, which consists of a combination of various indoor and outdoor sports facilities.</p> <p>University resources are available to teachers and undergraduates, including a scientific library with electronic resource halls, a publishing house, dormitories, a student household complex, a sanatorium-dispensary, 2 medical offices.</p> <p>A printing house equipped with the necessary equipment for the publication of teaching aids, books, visual aids; an editorial and publishing department with a production site on which printing equipment is installed operates.</p> <p>Offices for administration, teaching staff, staff, affordable modern equipment contribute to maintaining the goals of educational programs, the expected learning outcomes of undergraduates and provide an atmosphere conducive to learning.</p> <p>The classroom fund consists of lecture halls, seminar rooms, laboratory facilities, workplaces for undergraduates, as well as facilities, tools and equipment, modern instrumentation, meet the requirements of the OP.</p> <p>The material and technical base of the OP is represented by the following resources: the educational area of the premises is 327m², including 2 specialized laboratories in metrology with an area of 47 and 44 m² and an interdepartmental laboratory with an area of 693 m² (118 B), taking into account one undergraduate -6.4 m², where laboratory installations in several disciplines and research stands are installed. The educational process and scientific research are carried out in 5 specialized laboratories and subject classrooms, including computer classes of the department and scientific laboratories of the university.</p> <p>The laboratories are equipped with modern scientific equipment,</p>

	interactive whiteboards for conducting all types of classes, taking into account modern requirements for the use of innovative teaching technologies. There are 17 computers for use by undergraduates, undergraduates, teaching staff of the Department of electronic regulatory framework (ST RK, GOST, international standards, etc.),
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AGREEMENT SHEET

according to the Educational program
7M07120 «Mechanical Engineering»

Director of AID  A. S. Naukenova

Director of ASD  U. B. Nazarbek

Director of DEK  T. S. Bazhirov