Institute of Energy and Mechanical Engineering named after A. Burkitbayev
Department of "Technological machines and equipment"

EDUCATIONAL PROGRAM
6B07115 «Technological machines and equipment (by industry)»

Code and classification of the field of education:	6B07 «Engineering, manufacturing and civil engineering»
Code and classification of training directions:	6B071 «Engineering and engineering trades»
Group of educational programs:	B064 – «Mechanics and metal working»
Level based on NQF:	6
Level based on IQF:	6
Study period:	4 years
Amount of credits:	240

Almaty 2025

Educational program 6B07115 «Technological machines and equipment (by industry)» was approved at the meeting of K.I. Satbayev KazNRTU Academic Council
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Educational program 6B07115 «Technological machines and equipment (by industry)» was developed by Academic committee based on direction 6B071 «Engineering and engineering trades»

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List of abbreviations and designations

NCJS KazNRTU named after K. I. Satbayev– NCJS «Kazakh National Research Technical University named after K.I. Satbayev»;
SOSE – State obligatory standard of education of the Republic of Kazakhstan;
EP - educational program;
IWS – independent work of a student (student, undergraduate, doctoral student);
IWST – independent work of a student with a teacher (independent work of a student (undergraduate, doctoral student) with a teacher);
WC – working curriculum;
UC – university component;
CC – component of choice;
NQF – National Qualifications Framework; S
QF – Sectoral Qualifications Framework;
LO – learning outcomes;
KC – key competencies;
SDGs – Sustainable Development Goals.

1. Description of educational program

The field of professional activity of the Bachelor of the educational program "Operational and service Engineering" includes:

- sections of science and technology containing a set of tools, techniques, methods and methods of human activity aimed at creating competitive engineering products and based on the use of modern methods and means of design, calculation, mathematical, physical and computer modeling;
- organization and execution of works on creation, installation, commissioning, maintenance, operation, diagnostics and repair of technological machines and equipment, development of technological processes for the production of parts and assemblies.

The objects of the bachelor 's professional activity are:

- technological machines and equipment of various complexes;
- technological equipment and means of mechanization and automation of technological processes;
- production technological processes, their development and development of new technologies;
- installation and repair of technological machines and equipment;
- means of information, metrological, diagnostic and management support of technological systems to achieve the quality of manufactured products;
- means of testing and quality control of technological machines and equipment;
- technological processes of metal structures assembly;
- welding equipment and power supplies, assembly and welding devices;
- regulatory and technical documentation, standardization and certification systems, methods and means of testing and quality control of products.

The types of professional activity are:

- experimental research;
- design and analytical;
- production and technological;
- service and operational;
- installation and commissioning;
- organizational and managerial.

The subjects of the bachelor's professional activity are:

- technological machines and equipment; energy equipment;
- machine drive systems;
- motion control systems;
- operator's life support systems;
- structural and operational materials;
- equipment for manufacturing, testing and disposal of technological machines;
- equipment for maintenance and repair of technological machines;
- control and measuring devices for the manufacture and operation of machines;

- equipment for automating the working processes of machines;
- equipment for designing machines

2. Purpose and objectives of educational program

Purpose of EP: The aim of the educational program is to provide comprehensive and qualitative training of competitive, highly qualified specialists ready to solve practical and theoretical problems of professional activity in modern conditions on the basis of development of skills and abilities necessary for the future specialist. This goal is implemented in accordance with the objectives of SDGs 4,9,12: Quality education; Modernization of technological equipment using the achievements of science and technology; Responsible consumption and production.

Tasks of EP:

- study of a cycle of general education disciplines to provide social and humanitarian education based on the laws of socio-economic development of society, history, modern information technologies, the state language, foreign and Russian languages;
- study of the cycle of basic disciplines providing knowledge of natural, general technical and economic disciplines as the basis of vocational education;
- the cycle of the main disciplines is aimed at studying the main theoretical aspects of technological machines, theoretical and practical methods, areas of human activity based on the creation of competitive technological machines and modern methods and means of human design, mathematical, physical and computer modeling of technological processes;
- study of disciplines that form the skills of planning and organizing research work, designing technologies and devices;
- familiarity with the technologies and equipment of enterprises at different stages of practical training;
- mastering the skills and abilities of laboratory research, technological calculations, selection and design of equipment using modern computer technologies and programs
- acquiring skills of using innovative technologies in the field of machinery and equipment operation in accordance with the goal 9 of the SDGs;
- studying methods of rational use of energy resources, utilization of production waste in accordance with the goal 12 of the SDGs.

3. Requirements for evaluating the educational program learning outcomes

The volume of the bachelor's degree program is 240 credits, regardless of the form of study, the educational technologies used, the implementation of the bachelor's program using the online form, the implementation of the bachelor's program according to an individual curriculum, including accelerated learning.

Descriptors of the level and scope of knowledge, skills, skills and competencies

A – knowledge and understanding:

A1 - The ability to logically represent the acquired knowledge and understanding of systemic relationships within disciplines, as well as interdisciplinary relations in modern science.

A2 - Knowledge of approaches and methods of critical analysis, the ability to use them practically in relation to various forms and processes of production.

A3 - to carry out basic calculations of the main parameters of technological machines, to justify their choice depending on production levels.

C – application of knowledge and understanding

B1 - Independent development and promotion of various options for solving professional tasks using theoretical and practical knowledge

B2 - to put forward hypotheses for the acquisition of new knowledge necessary for daily professional activity and continuing education

B3 - based on basic knowledge, be able to adequately navigate in various situations

C – formation of judgments

C1 - on the basis of knowledge about economic laws, the formation of hypotheses, forecasting and planning of economic activity of the enterprise.

C2 - be able to work in a team, correctly defend your point of view, and offer new solutions.

C3 - skills of daily acquisition of new knowledge necessary for professional activity.

D – personal abilities

D1 - compliance with the norms of business ethics, possession of ethical and moral standards of behavior.

D2 - the ability to find a compromise, correlate your opinion with the opinion of the team

D3 - to know social and ethical values based on public opinion, traditions, customs, social norms and be able to navigate them in their professional activities.

Competencies upon completion of training

General cultural competencies (GCC)	
GCC 1	Ability to communicate orally and in writing in the state, Russian and foreign languages to solve problems of interpersonal and intercultural interaction
GCC 2	Understanding and practical use of healthy lifestyle norms, including prevention issues, the ability to use physical culture to optimize performance
GCC 3	The ability to analyze the main stages and patterns of the historical development of society for the formation of a civic position
GCC 4	The ability to use the basics of philosophical knowledge to form a worldview position
GCC 5	The ability to critically use the methods of modern science in practice
GCC 6	Awareness of the need and acquisition of the ability to independently study and improve their qualifications throughout their working life
GCC 7	Knowledge and understanding of professional ethical standards, proficiency in professional communication techniques

GCC 8	Ability to work in a team, tolerantly perceiving social, ethnic, confessional and cultural differences
GCC 9	The ability to use the basics of economic knowledge in various fields of activity
General professional competencies (GPC)	
GPC-1	The ability to acquire new knowledge with a high degree of independence using modern educational and information technologies
GPC-2	Possession of computer skills sufficient for professional activity with basic programming
GPC-3	Knowledge of the basic methods, methods and means of obtaining, storing, processing information, the ability to use modern technical means and information technologies using traditional information carriers, distributed knowledge bases, as well as information in global computer networks to solve communication problems
GPC-4	Understanding the essence and significance of information in the development of modern society, the ability to receive and process information from various sources, the willingness to interpret, structure and formalize information in a form accessible to others
GPC-5	Ability to solve standard tasks of professional activity on the basis of information and bibliographic culture with the use of information and communication technologies and taking into account the basic requirements of information security
Professional competencies (PC)	
PC1	The ability to systematically study scientific and technical information, domestic and foreign experience in the relevant training profile
PC 2	The ability to take part in the preparation of scientific reports on the completed task and implement the results of research and development in the field of technological machines and equipment
PC 3	Ability to participate in work on innovative projects using basic research methods
PC 4	Ability to model technical objects and technological processes using standard packages and computer-aided design tools, willingness to conduct experiments according to specified methods with processing and analysis of results
PC 5	Knowledge of approaches and methods of critical analysis, the ability to use them practically in relation to various forms and processes of technological processes
PC 6	The ability to independently master new equipment, technological and technical documentation, make adjustments to it in relation to operating conditions
PC 7	The ability to take part in the calculation and design of parts and assemblies of technological machines in accordance with the technical specifications and the use of standard design automation tools
PC 8	The ability to conduct patent research in order to ensure the patent purity of new design solutions and their patentability with the determination of indicators of the technical level of the designed products
PC 9	The ability to investigate and optimize the operating modes of technological machines during their operation
PC 10	The ability to conduct a preliminary feasibility study of design solutions
PC 11	The ability to design the technical equipment of workplaces with the placement of technological equipment, the ability to master the equipment being introduced
PC 12	The ability to participate in the work on fine-tuning and mastering of technological processes during the preparation of production of new products, to check the quality of installation and commissioning during testing and commissioning of new samples of products, assemblies and parts of manufactured products

PC 13	Ability to check the technical condition and residual life of technological equipment, organize preventive inspection and maintenance of technological machines and equipment
PC 14	The ability to carry out measures for the prevention of occupational injuries and occupational diseases, to monitor compliance with the environmental safety of the work carried out
PC 15	Ability to choose basic and auxiliary materials, methods of implementation of technological processes, to apply progressive methods of operation of technological equipment
PC 16	Master the basic methods of calculating the parameters of technological equipment, the methodology of their selection according to reference books and catalogs.

4. Passport of educational program

4.1. General information

№	Field name	Comments
1	Code and classification of the field of education	6B07 « Engineering, manufacturing and civil engineering»
2	Code and classification of training directions	6B071 «Engineering and engineering trades»
3	Educational program group	B064 «Mechanics and metal working»
4	Educational program name	"Technological machines and equipment (by industry)"
5	Short description of educational program	Educational program "Technological machines and equipment (by industry)" in the following industries: - metallurgical machinery and equipment; - mining machinery and equipment; - machinery and equipment of the oil and gas industry;
6	Purpose of EP	The aim of the educational program is to provide comprehensive and qualitative training of competitive, highly qualified specialists ready to solve practical and theoretical problems of professional activity in modern conditions on the basis of development of skills and abilities necessary for the future specialist. This goal is implemented in accordance with the objectives of SDGs (4,9,12): Quality education; Modernization of technological equipment using the achievements of science and technology; Responsible consumption and production.
7	Type of EP	new
8	The level based on NQF	6
9	The level based on IQF	6
10	Distinctive features of EP	no
11	List of competencies of educational program	QC 1.Communication skills QC Basic literacy in natural sciences QC 3.General engineering competencies QC 4. Professional competencies QC 5. Engineering and computer competencies QC 6.Engineering and working competencies QC 7. Socio-economic competencies QC 8. Special professional competencies
12	Learning outcomes of educational program	**LO**1: To use ethical and legal norms regulating the attitude of a person towards a person, society and the environment. Be able to practically apply the basic patterns and forms of regulation of social behavior, human and civil rights and freedoms in the development of social projects, demonstrating respect for people, tolerance to another culture, and willingness to maintain partnerships **LO**2: Apply modern methods for the development of low-waste, energy-saving technologies that ensure the safety of human life and their protection from the possible consequences of accidents, disasters and natural calamities, ways of rational use of raw

		materials, energy and other types of resources in accordance with the 12 Sustainable Development Goals (SDG 12): Responsible Consumption and Production. **LO**3: Demonstrate knowledge of higher mathematics, physics and other natural sciences and apply it to solve engineering problems in process machine operation in accordance with Sustainable Development Goal (SDG 9): Build resilient infrastructure, promote inclusive and sustainable industrialization and innovation. Possess knowledge of operational reliability and technical diagnostics of machines and equipment. Select robotic systems and manipulators for production processes. **LO**4: Choose the main and auxiliary materials and methods of implementation of the main technological processes and apply progressive methods of operation of technological equipment **LO5** Develop the procedure for installation and commissioning during testing and commissioning of new technological equipment. Assess the technical condition and residual life of technological equipment, organize preventive inspection and maintenance of equipment using diagnostic devices, process measurement results **LO6**: Perform standardization work, technical preparation for certification of technical means and equipment, organize metrological support of technological processes using standard quality control methods **LO7**:: Develop working design and technical documentation, execute completed design work with verification of compliance of the developed projects and technical documentation with standards, specifications and other regulatory documents **LO8**: To show knowledge in the field of operation and repair of technological machines and equipment for integrated management and monitoring of industrial production **LO9**: Apply standard calculation methods in the design of parts and assemblies of technological machines and welded structures. Use standard design automation tools in calculations **LO10**: To use the principles of formulation and algorithms for solving research tasks in order to systematically develop knowledge about project management. To evaluate the technical and economic performance of industrial enterprises **LO11**: Prepare applications for equipment and spare parts, prepare technical documentation for equipment repairs, analyze and monitor the technical condition of machines, as well as make management decisions

		based on their results **LO12**: Analyze and choose the main methods, methods and means of obtaining, storing, processing information, is able to use modern technical means and information technologies using traditional information carriers, distributed knowledge bases, as well as information in global computer networks to solve communication problems **LO13**:: Demonstrate knowledge and skills in the field of dynamics, reliability and technical diagnostics of technological machines of main and auxiliary production **LO14** Perform strength calculations and calculations of machine structures, design, adjust, repair equipment of various types, solve problems of efficient operation of mechanical equipment, as well as operate any complex of equipment in the technological processes of mining, metallurgical and oil and gas industries
13	Education form	full
14	Period of training	4 years
15	Amount of credits	240
16	Languages of instruction	Kazakh, Russian, English
17	Academic degree awarded	Bachelor of Engineering and Technology
18	Developers and authors	Academic Affairs Committee

4.2. Relationship between the achievability of the formed learning outcomes based on educational program and academic disciplines

№	Name of the discipline	Short description of the discipline	Number of credits	Generated learning outcomes (codes)														
				LO1	LO2	LO 3	LO 4	LO 5	LO 6	LO 7	LO8	LO 9	LO10	LO1 1	LO1 2	LO1 3	LO1 4
Cycle of general education disciplines Required component																		
1	English language	English is a discipline of the general education cycle. After determining the level (according to the results of diagnostic testing or IELTS results), students are divided into groups and disciplines. The name of the discipline corresponds to the level of English proficiency. During the transition from level to level, the prerequisites and post-prerequisites of the discipline are observed	5	**v**													
2	Kazakh (Russian) language	The socio-political, socio-cultural spheres of communication and functional styles of the modern Kazakh (Russian) language are considered. The course highlights the specifics of scientific style in order to develop and activate professional and communicative skills and abilities of students, allows students to practically master the basics of scientific style and develops the ability to perform structural and semantic analysis of the text	5	**v**													

3	Information and communication technologies (in English)	Required component. The task of studying the discipline is to acquire theoretical knowledge about information processes, about new information technologies, local and global computer networks, methods of information protection; to acquire skills in using text editors and tabular processors; to create databases and various categories of application programs	5	**v**													
4	History of Kazakhstan	The course studies historical events, phenomena, facts, processes that took place on the territory of Kazakhstan from ancient times to the present day. The sections of the discipline include: the steppe empire of the Turks; early feudal states on the territory of Kazakhstan; Kazakhstan during the Mongol conquest (XIII century), medieval states in the XIV-XV centuries. The epoch of the Kazakh Khanate XV-XVIII centuries. Kazakhstan as part of the Russian Empire, Kazakhstan during the Great Patriotic War, during the formation of independence and at the present stage	5	**v**													
5	Philosophy	Philosophy forms and develops critical and creative thinking, worldview and culture, provides knowledge about the most general and fundamental problems of	5	**v**													

		existence and gives them a methodology for solving various theoretical and practical issues. Philosophy expands the horizon of vision of the modern world, forms citizenship and patriotism, promotes self-esteem, awareness of the value of human existence. It teaches you to think and act correctly, develops practical and cognitive skills, helps you to search and find ways and ways of living in harmony with yourself, society, and the world around you															
6	Module of socio-political knowledge (sociology, political science)	The study of the course contributes to the formation of students' theoretical knowledge about society as an integral system, provides the political aspect of training a highly qualified specialist on the basis of modern world and domestic political thought. The discipline is designed to improve the quality of both general humanitarian and professional training of students. Knowledge in the field of sociology and political science is necessary to understand political processes, to form a political culture, to develop a personal position and a clearer understanding of the measure of one's responsibility	3	**v**													
7	Module of socio-political knowledge (cultural	The module of socio-political knowledge (cultural studies,	5	**v**													

	studies, psychology)	psychology) is designed to familiarize students with the cultural achievements of mankind, to understand and assimilate the basic forms and universal patterns of formation and development of culture. During the course of cultural studies, general problems of the theory of culture, leading cultural concepts, universal patterns and mechanisms of formation and development of culture, the main historical stages of the formation and development of Kazakh culture are considered. The regularities of the emergence, development and functioning of mental processes, states, properties of a person engaged in a particular activity, the regularities of the development and functioning of the psyche as a special form of vital activity are also studied															
Cycle of general education disciplines Component of choice																	
8	Fundamentals of anti-corruption culture	_to form an informed understanding of the problem of corruption in society, to develop anti-corruption skills, as well as to educate civic responsibility and ethical principles. Contents_ basic theoretical and practical knowledge about corruption, analysis of corruption phenomena, strategies	5	**v**													

		and methods of combating them, formation of adequate behavior and values aimed at creating an honest and open society															
9	Fundamentals of economics and entrepreneurship	To develop basic knowledge of economic processes and skills in entrepreneurial activities. Content: The course aims to develop skills in analyzing economic concepts such as supply and demand, and market equilibrium. It includes the basics of creating and managing a business, developing business plans, risk assessment, and strategic decision-making.	5									v					
10	Ecology and life safety	The purpose of the discipline: to acquaint students with the tasks of ecology as a science, its sections and conclusions that find application in various fields of practical activity. Brief description: ecological terms, laws of functioning of natural systems are considered; environmental monitoring and management in the field of its security; sources of air, water, soil pollution and ways to solve environmental problems; emergency situations of natural and man-made nature.	5		v												
11	Fundamentals of scientific research methods	Purpose: to form a systematic understanding of the methodology of scientific cognition among	5										v		v		

		students; to develop scientific thinking skills; to form experience in organizing and conducting scientific research; to develop a competence-based approach to the use of methods and rules for conducting research in the field of mechanical engineering, related processes and their technologies. Contents: stages of scientific research, terms and concepts, methods of conducting an experiment, mathematical methods of processing research results. Concepts of engineering, laboratory and industrial experiment, bench research.															
12	Basics of Financial Literacy	Purpose: acquiring knowledge and skills in the field of personal finance management, including budget planning, use of financial instruments, taxation and investments to ensure effective management and increase of own funds. Contents: as part of the course, students will master the basics of financial management, learn how to create a budget, use various financial products, plan and pay taxes. They will also gain practical skills in analyzing financial information and choosing investment strategies.	5									**v**					
Cycle of basic disciplines																	

University component																		
13	Mathematics I	Purpose: to introduce students to the fundamental concepts of linear algebra, analytical geometry and mathematical analysis. To form the ability to solve typical and applied problems of the discipline. Contents_ Elements of linear algebra, vector algebra and analytical geometry. Introduction to the analysis. Differential calculus of a function of one variable. The study of functions using derivatives. Functions of several variables. Partial derivatives. The extremum of a function of two variables.	5			**v**												
14	Physics	Purpose:To form ideas about the modern physical picture of the world and scientific worldview, the ability to use knowledge of fundamental laws, theories of classical and modern physics. Contents_ physical fundamentals of mechanics, fundamentals of molecular physics and thermodynamics, electricity and magnetism, vibrations and waves, optics and fundamentals of quantum physics.	5			**v**												
15	Mathematics II	Purpose: To teach students integration methods. To teach you how to choose the right method for finding the primitive. To teach how	5			**v**												

		to apply a certain integral to solve practical problems. Contents_ integral calculus of the function of one and two variables, series theory. Indefinite integrals, methods of their calculation. Certain integrals and applications of certain integrals. Improper integrals. Theory of numerical and functional series, Taylor and Maclaurin series, application of series to approximate calculations															
16	Engineering and computer graphics	Purpose: formation of knowledge of drawing construction, skills to read and develop graphic documentation. The student must apply the achievements of modern computer technology in all areas of the transport industry. Contents_ ESCD standards. Graphic primitives. Methods and properties of orthogonal projection. The Monge plot. GOST 2.305-68. Incisions. Axonometric projections. Types of connections. Polyhedra. Sketches of details. Detailing. Ways to transform a drawing. Creating a 3M complex solid-state object in the AutoCAD system,	5							v							
17	Training workshops	The course provides for the study of the main methods related to repair, repair and operation conditions of technological equipment, repair quality	4					v					v				

		requirements, selection of necessary machinery and equipment and materials. This discipline is a course of choice for the training of mechanics. As a result of mastering the discipline, students gain practical skills in maintenance and repair of components and parts of technological equipment and apply appropriate technical means and tools															
18	Fundamentals of the specialty	The discipline is one of the disciplines of the component of choice, which is studied by future representatives of the mechanic's service. The course content allows future mechanics to get an idea of such a technically and technologically complex industry. During the study, students will be introduced to the technological processes and the main equipment of the mining and metallurgical and oil and gas industries, operational and service industries of the industry.	5										v				
19	Theoretical and applied mechanics	To involve students in the development and solution of tasks that help bridge the gap between scientific theory and engineering practice. Contents_ Theoretical mechanics, theory of mechanisms and machines. Theoretical	5													v	

		mechanics deals with the general laws of mechanical movements of material bodies and the mechanical interactions between them. In the theory of mechanisms and machines, general methods of research, construction, and kinematics of mechanisms and machines are studied															
20	Basics of hydraulics and hydraulic drives of technological machines	The study of the course is aimed at forming a complex of knowledge of the basic laws of hydraulics; the ability to apply these laws to solve practical computational problems; possession of standard hydraulic calculations and methods of experimental research of hydraulic systems. Application of knowledge in the field of technical fluid mechanics (hydraulics), for the calculation of hydraulic pressure systems, hydraulic machines, hydraulic and pneumatic drives, widely used in industry. Complete hydraulic calculation of various hydraulic systems, hydraulic and pneumatic equipment drives. Obtaining the basics of knowledge in the field of hydraulics – theoretical fluid mechanics in the field of hydraulic drives.	6			**v**									**v**		
21	Interchangeability, standardization and technical measurements	Studying the basic laws and concepts of standardization and interchangeability, methods and	5						**v**	**v**							

		means of controlling deviations of the shape, roughness and waviness of the surfaces of parts, the role of standardization in improving the quality of machines Interchangeability binds in a single whole design, production technology and control products. Standardization and unification of parts and elements contribute to the acceleration and cheapening of the design and manufacture of products...															
22	Construction materials processing machinery and equipment	The solution of the most important technical problems associated with the creation and development of the most economical materials, increasing the accuracy, reliability and performance of mechanisms and devices depends largely on the development of materials science and technology for producing and processing materials, concretization of knowledge about the relationship between the composition, structure and properties of materials used for management of the structure and properties of structural materials.	5				**v**										
23	Strength of materials	to independently calculate structural elements, mechanisms and machine parts. Contents_ Stretching and compression. Stresses in cross sections and deformations of a straight rod.	5			**v**											**v**	

		Mechanical properties of materials under tension and compression. Calculation of tensile and compressive strength and stiffness. Geometric characteristics of flat sections. Shear and torsion. Calculation of strength and torsional stiffness. The bend. Normal and tangential bending stresses															
24	Thermodynamics, heat transfer and heat engineering equipment	Assimilation of methods for obtaining, converting, transferring and using heat, which allows for the operation of technological machines and equipment saving fuel and energy resources, intensifying technological processes, identifying and using thermal energy resources.	5			v	v										
25	Industrial safety	Purpose: A complex of scientifically based constructive, technological, organizational measures aimed at minimizing the man-made impact of objects on environmental components. Forecasting, assessment of the consequences of man-made impacts on the components of the natural environment during the construction and operation of facilities. Classification, composition, sources of technogenic impact of objects. Technology of restoration and	5									v					

		optimization of the state of components of the natural environment															
26	Bases of designing and details of cars	Purpose: to acquire knowledge of calculations and design of machine parts and assemblies, taking into account the criteria of strength, reliability and stability. Contents_ general principles of design and construction, construction of models and calculation algorithms for standard machine parts taking into account performance criteria, fundamentals of theory and methodology for calculating standard machine parts, computer technologies for designing assemblies and machine parts. Basic requirements for machine parts and assemblies	5						**v**		**v**						
27	Electrotechnics and Microelectronics	Electrical and magnetic circuits. Basic definitions, parameters and methods of calculation of DC electrical circuits. Analysis and calculation of linear AC circuits. Analysis and calculation of electrical circuits with nonlinear elements. Analysis and calculation of magnetic circuits. Electromagnetic devices and electrical machines. Fundamentals of electronics and electrical measurements. The element base of modern electronic devices.	5		**v**	**v**											

		Semiconductor elements. Electronic equipment power supply devices. Amplifiers of electrical signals. Electronic amplifiers and generators. Elements of pulse technology. Pulse and auto-generator devices. Fundamentals of digital and microelectronics. Microprocessor tools															
28	Fundamentals of Artificial Intelligence	Purpose: to familiarize students with the basic concepts, methods and technologies in the field of artificial intelligence: machine learning, computer vision, natural language processing, etc. Contents: general definition of artificial intelligence, intelligent agents, information retrieval and state space exploration, logical agents, architecture of artificial intelligence systems, expert systems, observational learning, statistical learning methods, probabilistic processing of linguistic information, semantic models, natural language processing systems	5											v			
29	The dynamics and durability of technological machines	Students study the criteria for calculating technological machines and structures for strength. To learn the formulation and analysis of calculation results, the ability to determine operating stresses, to master a number of accurate and	4												v	v	

		approximate methods for determining the characteristics of operational loads, considering the bearing capacity of parts and structures as a random variable, to be able to calculate dynamic loads in drives and other parts of technological machines															
30	Reliability of technological machines	The course provides students with knowledge and skills that provide a creative approach to solving problems of reliability and durability of technological machines and equipment necessary to increase the level of automation, reduce huge repair costs from machine downtime, and ensure safety during equipment operation. When studying disciplines, students master the issues of ensuring the reliability and durability of technological equipment; principles of rational use of technical parameters of technological machines	5												v		
Cycle of basic disciplines Component of choice																	
31	Drilling machines and complexes	The construction of equipment for drilling wells for the purpose of oil and gas production, the device and the main directions of further development of drilling machines and systems in accordance with the trends of global technical progress.	5							v			v				

		Evaluating the effectiveness of machinery and equipment for choosing a rational way of their operation The technical level, ways to improve the design, methods of operation of drilling machines and systems															
32	Technological lines and complexes of metallurgical production	The course provides students with the necessary knowledge about the scale of metallurgical production and the continuity of its constituent processes, patterns of construction and trends in the development of technological lines of metallurgical production, necessary for production, design and research activities. Students' mastering of technologies for obtaining various metals, starting with enrichment and ending with metalworking processes by pressure, the structure of existing technological lines and complexes of metallurgical workshops and prospects for the development of metallurgical production, the principle of choosing machines and mechanisms, determining the required number of them for lines and complexes of metallurgical workshops	5		v						v						
33	Mining technology	Prospects for the development of underground mining of mineral deposits. Mining and geological	5		v						v						

		characteristics of mineral deposits. Basic information about mining in underground mining. The order and methods of ore extraction and the sequence of mining blocks. The main indicators of ore extraction. Losses and dilution of ore. Concepts about the mine field, mine. Stages of development of mine fields. Requirements for autopsy.															
34	Technological processes in the oil and gas industry	Training bachelors in the technology of well construction, well oil production, scientific understanding of the main technological processes and work in the oil and gas industry. Methods of opening productive objects; challenge inflow and development of wells; choice of methods of influence on the productive layer; choice of methods of impact on the bottomhole well zone; methods of operating wells; calculation of operating modes of the "well-reservoir" system.	5		**v**						**v**						
35	Legal regulation of intellectual property	Purpose: the goal is to form a holistic understanding of the system of legal regulation of intellectual property, including basic principles, mechanisms for protecting intellectual property rights and features of their implementation. Contents: The discipline covers the	5	**v**													

		basics of IP law, including copyright, patents, trademarks, and industrial designs. Students learn how to protect and manage intellectual property rights, and consider legal disputes and methods for resolving them.															
36	Pumps, fans, compressors	The device is technologically important and large energy consumers in the industry: pumps, fans and compressors of various types, parameters, effective modes of their operation. Practically mastered the methods of design and installation of pumping stations, fan installations of the main ventilation. Piping networks, their device and installation, auxiliary equipment, ensuring efficient and safe operation of pumping, fan and compressor units are being studied.	5								v			v			
37	Internal combustion engines	Thermodynamic cycles internal combustion engines. The designs of internal combustion engines used in the oil and gas industry, the theory of working processes, the principles of their work, the basic concepts and definitions, technical and economic indicators, designs of engine systems, the rules of their technical operation, maintenance and repair. The processes of compression, combustion and expansion. Calculation of	5			v									v		

		parameters of the working mixture in these processes.															
38	Auxiliary transport equipment of metallurgical shops	General information about mechano-transport equipment of non-ferrous metallurgy plants. Equipment warehouses bulk materials. The device and design of car dumpers. Silos and their closures. Feeder designs. Receptions equipment maintenance depending on its type and purpose. The main parameters of the mechanical mode. Purpose, device, principle of operation and features of operation of technological equipment of pyro-and hydrometallurgical production	5				**v**				**v**						
39	Technical audit	Analysis of operational documentation. Analysis of technical documentation for equipment installations. Analysis of technical documentation for vessels and apparatuses. Analysis of technical documentation for pipelines. Analysis of technical documentation for dynamic equipment. Conducting a field survey of equipment. Conducting a field examination of blood vessels and apparatuses. Conducting a field survey of pipelines. Conducting a field survey of dynamic equipment. Analysis of corrosion-erosion wear of equipment	5											**v**		**v**	

40	Gas-pumping units	The main features and current state of pipeline transportation of natural gas. Modes and performance of gas pumping units at compressor stations. Features of the properties and aerodynamics of currents in gas pumping units. Used in the gas industry types of centrifugal feeders. Designs and characteristics of the Central Natural Gas Center. Methods for determining the technical condition and power consumption Gas pumping units with power transmission.	5							v			v				
41	Fundamentals of sustainable development and ESG projects in Kazakhstan	Purpose: the goal is for students to master the theoretical foundations and practical skills in the field of sustainable development and ESG, as well as to develop an understanding of the role of these aspects in the modern economic and social development of Kazakhstan. Contents: introduces the principles of sustainable development and the implementation of ESG practices in Kazakhstan, includes the study of national and international standards, analysis of successful ESG projects and strategies for their implementation in enterprises and organizations..	5	v					v								

42	Computer-aided design of technological machines	The organization of the process of designing objects of technology, the basic principles of construction and structure of computer-aided design systems, the composition and types of provision of computer-aided design systems, analysis of workflows of technological machines using computers, elements of computer-aided design systems of technological machines. The structure and classification of computer-aided design systems, with various types of software for computer-aided design	6									v			v		
43	Computer technologies for calculation, modeling and design	The course is aimed at students studying the basics of modeling technological machines and equipment, to gain practical skills of working with computer graphics in the process of designing parts and assemblies, to form knowledge about trends in the development of computer graphics, to form a professional student's consciousness. When studying the discipline, students receive: practical skills of working with modern computer graphics programs; master methods of using computer graphics in the tasks of the discipline; knowledge of the theoretical foundations of the finite element method; obtaining skills in	6								v					v	

		analyzing the results of computer modeling and design; fundamentals of system and automated modeling and design of technical objects; classification, technical characteristics and capabilities of various computer design systems and database management systems.															
44	Calculation and design of technological machines and equipment	The concept of the essence and purpose of the mechanism. General principles of designing technological equipment. Kinematic schemes of technological machines and equipments, methods for obtaining new technical solutions in the design, construction of gearbox housing parts; standard calculation of mechanical gears, design of the main elements of mechanical gears, including using computer-aided design methods	6									v					v
Cycle of profile disciplines University component																	
45	Processes of machine-building production	The purpose of the discipline is to acquire knowledge of technological methods for obtaining and processing blanks and machine parts. The discipline studies the general characteristics of metals and alloys used in mechanical engineering, the technological foundations of metallurgical production, the			v							v					

		technology of metal processing by pressure, the technology of foundry production, the technology of welding production. The technology of production of blanks and machine parts from non-metallic materials is considered; features of welding of various metals and alloys.															
46	Repair of technological machines	Wear and aging of technological machines and equipment. Design of repair production. Organization and management of the electromechanical service. Basic information on the methods of repair, improvement of technological equipment. Engineering support repair. Determine defects in the nodes of machines and units, instilling in students the practical skills necessary in the repair and maintenance of equipment for mining and metallurgical production. Worn parts recovery technology	5					v						v			
47	Instrumentation and automation of technological machines	Formation of the future specialist knowledge of the design of devices, their purpose and principles of operation. As well as special training of engineering and technical personnel with scientific and practical knowledge in the field of operation, as it solves relevant	5					v			v						

		engineering and scientific problems in the field of quality, performance properties and rational use of fuels, oils, lubricants and technical fluids.															
48	Installation and exploitation of technological machines	Formation of the future specialist knowledge of the design of devices, their purpose and principles of operation. As well as special training of engineering and technical personnel with scientific and practical knowledge in the field of operation, as it solves relevant engineering and scientific problems in the field of quality, performance properties and rational use of fuels, oils, lubricants and technical fluids	6					v						v			
49	Metall welding and ccutting	The course studies the physical foundations of the metal welding process; energy sources during welding; electric arc. Classification of welding arcs and their characteristics; dynamic characteristics of power sources; transformers with increased and normal scattering; welding rectifiers; aggregates and converters; multi-post power sources of the welding arc; auxiliary devices of power sources; specialized power sources for electroslag and plasma welding; safety during operation of welding power sources. General information	4			v										v	

		about welding materials. Classification of welding materials.															
50	Technical diagnostics of technological equipment	The course is aimed at studying the theoretical foundations of technical diagnostics and obtaining practical skills in the use of non-destructive testing methods to assess the technical condition of technological machines and equipment; to familiarize students with the basics of the theory of technical diagnostics, types of technical condition, controlled parameters, technical diagnostics systems; to study the physical foundations of non-destructive testing methods for detecting and diagnosing malfunctions of technological equipment; familiarization with equipment for non-destructive testing, test methods, acquisition of practical skills	4					v								v	
Cycle of profile disciplines Component of choice																	
51	Transportation vehicles	General information about transport vehicles. Technological schemes of transport. Basics of calculating transport vehicles. Railway transport. Automated system for the design of electric locomotive transport. Self-propelled transport. Scraper installation. Conveyor installation. Pneumo and hydrotransport installations.	5												v	v	

		Pipeline container pneumatic conveying installations. Mechanization of loading and unloading and installation work. Vehicles on the surface of mines and mines. Technological complex surface. Constructions of transport vehicles															
52	Hydraulic machines and compressors in the oil and gas industry	Acquisition of solid theoretical and practical knowledge of the designs and principles of operation of hydraulic machines, compressors, widely used in the transportation of oil, petroleum products and gas through pipelines. General schemes of hydraulic machines and compressors. The principle of the volumetric, flow machines. Varieties of hydraulic and compressor machines. Theories of action and characteristics. Areas, features of application, regulation of operating modes	5								**v**						
53	Lifting installations	Acquisition of solid theoretical and practical knowledge of the designs and principles of operation of hydraulic machines, compressors, widely used in the transportation of oil, petroleum products and gas through pipelines. General schemes of hydraulic machines and compressors. The principle of the volumetric, flow machines. Varieties of hydraulic and	5								**v**						

		compressor machines. Theories of action and characteristics. Areas, features of application, regulation of operating modes															
54	Equipment for ore preparation	The course is aimed at training specialists in the field of operation of technological equipment for the preparation of ore raw materials, possessing a system of theoretical and practical knowledge, equipment and technology of the ore preparation process, having an idea of the purpose and role of preparatory processes in the enrichment of minerals, methods of calculation of technological equipment, selection and technical and economic indicators of equipment, purpose, device, operation and operating conditions, as well as the basics of calculating ore preparation machines and equipment	5								**v**			**v**			
	Non-standard equipment	Preparation of bachelors for independent production and technical activities at enterprises for the production and repair of technological equipment based on the development of theoretical and practical material for the design of non-standard equipment, the study of the basics of the design of technical objects, the acquisition of	4								**v**			**v**			

		practical skills in the design of special technological equipment.															
	Design of experiments bench and field tests	The course provides for the essence and methodology of scientific research, hardware design of a full-scale experiment. Familiarity with modern methods of planning experiments and estimating the measurement error of experimental results; mastering the types of experimental tests, methods of processing test results, modern methods of assessing reliability based on test results (resource, research, etc.). As a result of studying the discipline, methods of conducting experiments and types of tests are mastered to determine the resource and reliability of technological machines and equipment used in the industry	4										v				
55	Friction and wear	Patterns of external friction and wear on rough surfaces, modern friction theories, methods for determining friction coefficients, calculation and prediction of wear rates; types, abrasive wear mechanism; the importance of lubricants and additives for friction and wear, methods for selecting materials for moving parts, methods for improving wear resistance, equipment used in studies of	6			v	v										

		friction and wear, development directions.															
56	Lubrication of technological machines	The course is aimed at training specialists for production, design and research activities in the field of creation, improvement of lubrication systems and equipment, maintenance, modernization of technological equipment. The course is aimed at training specialists for production, design and research activities in the field of creation, improvement of lubrication systems and equipment, maintenance, modernization of technological equipment. The course covers: operational properties of technological machines; operational properties of elements of technological machines exposed to temperature, corrosion; lubrication of technological equipment; lubricating oils; additives to lubricating oils; greases; selection, supply and methods of calculating lubricant consumption	6				v										v
57	Fuels, oils and special liquids	The course is aimed at the formation of students' knowledge in the field of operation of technological equipment of industrial complexes, taking into account the rational use and storage of lubricants and special liquids, as	6				v										

		well as the organization of lubricants, collection, regeneration of oils and their storage at enterprises. The objectives of the discipline are: to provide information on the nomenclature of liquid mineral and synthetic oils, plastic, solid, sealing, preservative lubricants; to provide information about the methods and systems of lubrication of machines, issues of organization of the lubrication economy, collection, regeneration of oils and their storage at enterprises; to master the existing methods of assessing the quality of lubricants and special liquids.															
	Technology maintenance and repair of compressor units and hydraulic machines	The study of the discipline forms students' ideas about the basics of installation of compressor units and hydraulic machines, about the organization of the operation system, factors affecting operating conditions, as well as about modern technologies to improve operational reliability. When studying the discipline, the following are considered: general methods of installation of compressor stations; installation of technological equipment of a gas turbine shop; installation of equipment of gas engine shops; installation of auxiliary technological equipment	5					v			v						

58	Melting processing equipmen	Training of specialists for production, design and research activities in the field of creation, improvement and operation of mechanical equipment for smelting processing of the metallurgical cycle with knowledge of the scientific principles of the organization of technological design. As a result of studying the discipline, students master advanced methods of operation of mechanical equipment, the current state and prospects for the development of metallurgical production; the main scientific and technical problems of operation of technological equipment of metallurgical enterprises.	5								v			v			
59	Oil and gas field machines and mechanisms	The design of the wellbore completed by drilling. Units of capital and current repair of wells. Equipment and tools for the overhaul and maintenance of wells. Equipment wells for various methods of influence on the reservoir in order to increase its oil recovery. Collection system, preparation of well production. Equipment for maintaining reservoir pressure and oil displacement from productive formations	5								v			v			

60	Machines and equipment for gas and oil pipelines	Designation and classification equipment of oil and gas pipelines. Equipment, pump stations for transportation of crude oil and petroleum products. Technological scheme of binding equipment pump and compressor stations. Automation and control equipment pump and compressor stations.	5								v			v			
61	Mining machinery and equipment	Pneumatic and hydraulic drilling rigs for drilling holes and wells. Charging machines and installations. Designs of loading machines of cyclic and continuous action and excavators. Traction calculations. Machines and complexes for tunneling and cleaning works. Machines and equipment for vertical and inclined workings and shafts. Inspection and maintenance of the roof of mines and workings.	5										v				
62	Dewatering, fan and pneumatic plants	The device is technologically important and large energy consumers in the mining industry: pumps, fans and compressors of various types, the main parameters and scope of these installations. Methods of design and installation of pumping stations, fan installations for main ventilation. Pipeline networks, their device and installation, auxiliary equipment, ensuring efficient and safe	5								v						

		operation of pumping, fan and compressor units															
63	Dust-gas cleaning and recycling water supply of industrial enterprises	Studying the course gives students an idea of modern systems of dust and gas cleaning and recycling water supply of industrial enterprises. Contains basic information about the features of water supply of industrial enterprises. The systems and schemes of industrial water supply, methods and technologies of water treatment are considered, data on the design of installations for cooling recycled water and improving its quality, preventing suspension deposits and biological fouling, scale formation and corrosion in pipelines and equipment are contained	5								**v**						
64	Well overhaul equipment and installations	Principles of operation and device; basics of their theory of calculation, design and operation. Principles of economic operation of modern equipment overhaul wells. Equipment used in the overhaul of wells. Equipment for repair work on the well. Equipment for the collection and preparation of oil and gas for transportation. Modern methods of environmental protection in the overhaul of wells	5								**v**			**v**			
65	Engineering and well workover technology	Equipment and well workover tools; overhaul technology for	5								**v**					**v**	

		operating and maintenance conditions; their principles of operation and device; basics of their theory of calculation, design and operation. New technological methods and technical means of repair. Principles of economic operation of modern equipment overhaul wells; equipment used in various methods of oil and gas production															
66	Fundamentals of design of repair enterprises in the industry	The course is aimed at students acquiring theoretical knowledge and practical skills on the basics of design and reconstruction of repair enterprises of technical service of the industrial complex. Objectives of the discipline: study of the rules for designing technical service facilities of an industrial complex, substantiation of the production program of a service enterprise, design of production zones and auxiliary units, the basics of designing a construction part, design features of repair shops, technical and economic evaluation of design solutions	5						**v**	**v**							
67	Calculation and design of drilling equipment	The course is aimed at studying drilling machines and complexes that provide drilling of deep wells for oil and gas extraction from the Earth's interior. The program is focused on the training of a	5									**v**					**v**

		mechanical engineer and is aimed at an in-depth study of the physical foundations of the operation of drilling machines and equipment, as well as the design of new drilling equipment based on existing ones developed by world firms, the objectives of studying the discipline is to acquire in-depth knowledge in the field of professional activity															
68	Calculation and design of oil and gas equipment	Questions of the theory and practice of designing machines and mechanisms, the peculiarity of designing typical types of oilfield equipment; optimization of equipment design using computer-aided design systems. Designing machines for the oil and gas industry is the basis for the development of this industry, it contributes to the development of design skills. Basic design techniques for developing parametric equipment for oil and gas production	5									v					v
69	Projection of metallurgical machines	Training and preparation of specialists for production and research activities in the field of design of design developments and obtaining practical skills in designing typical and specific elements and assemblies of metallurgical machines using modern regulatory and technical	5							v							

		documentation. This is due to the predominant use of specialists in industry as middle-level engineering and technical workers engaged in the creation, operation and repair of modern metallurgical machinery units.															
70	Construction of mining transport vehicles and fixed installations	The basic principles, the technique of constructing mining machines and stationary installations, the manufacturability of the design. Indicators of technological design. Required documents and their registration. The establishment of rational design parameters of mining machines and stationary installations. The basic principles and methods of designing technological machines. Principles for calculating design parameters. Construction of assembly units and machine parts. Engineering design of MM and SI	5							v							
71	Fundamentals of energy saving industry	To form an idea of the general principles of developing an energy survey strategy, the modern regulatory framework for energy efficiency, methods for determining regulatory and prospective indicators of energy efficiency, methods for confirming energy efficiency indicators and compliance with their regulatory values, modern and promising	5		v												

		science-based technologies for energy conservation, control and improvement of energy quality, including the use of renewable energy sources															
72	Equipment 3-5 redistribution	Classification of working stands and rolling mills. The parameters of the rolling process. Calculation of the rolling force. Moment and power rolling. Determination of power of the electric drive. Workstations Bearings and pillows for rolling rolls. Mechanisms and devices for setting and balancing rolls. Beds of working stands. Drive rolls working stands. Gear stands. Ingot trucks. Continuous hot and cold rolling mills	5								v			v			
73	Energy-saving equipment and technologies in the oil and gas industry	Basic terms and definitions of energy saving. Energy saving in the oil and gas industry. The main uses of SER. Prospects for the development of unconventional energy sources. Energy-saving measures in the technology of the oil and gas industry. The use of heat pump installations in the gas and oil industry. Utilization and use of SER gas turbines at compressor stations of main gas pipelines	5		v												
74	Fundamentals of energy saving in repair and service production	To form an idea of the general principles of developing an energy survey strategy, the modern regulatory framework for energy	5		v												

		efficiency, methods for determining regulatory and prospective indicators of energy efficiency, methods for confirming energy efficiency indicators and compliance with their regulatory values, modern and promising science-based technologies for energy conservation, control and improvement of energy quality, including the use of renewable energy sources															
75	Fundamentals of Research and Development	To form an idea of the general principles of developing an energy survey strategy, the modern regulatory framework for energy efficiency, methods for determining regulatory and prospective indicators of energy efficiency, methods for confirming energy efficiency indicators and compliance with their regulatory values, modern and promising science-based technologies for energy conservation, control and improvement of energy quality, including the use of renewable energy sources	5										v				
76	Technique of field experiment	The course is aimed at studying methods of measuring physical quantities, acquiring practical skills in the use of measuring instruments and experimental techniques characteristic of the study of the	5										v				

		parameters of technological machines. The course gives students the knowledge necessary for further production, activity about the essence and methodology of scientific research, hardware design of a full-scale experiment As a result of mastering the discipline, the student will be able to independently prepare the equipment for conducting experimental research. Connect the assembled circuit and conduct experiments on existing equipment models.															
77	Methods and means of testing technological machines	The development of the discipline is aimed at acquiring knowledge and skills for the selection, creation, implementation and operation of measuring installations and systems, test benches; knowledge of methods and measuring instruments; metrological characteristics of measuring instruments; organization of testing and control activities in order to assess the conformity of products and quality indicators	5					v				v					
78	Inclusive engineering technologies	The purpose of the discipline is to develop future engineers' competencies in the development, design and implementation of technical solutions that take into account the principles of inclusive															

		engineering and accessibility. The discipline includes the study of the fundamentals of inclusive engineering: universal design and accessibility of engineering solutions, ethical and social aspects of inclusive engineering. Design of technical solutions with inclusion in mind, implementation of VR/AR simulations for modeling inclusive engineering systems. Students will acquire skills in applying modern technologies to create affordable solutions.															
79	Final examination	The purpose of the final attestation is to determine the assimilation degree of the state obligatory standard corresponding to the level of higher professional education, based on the results of which a document on education (diploma) is issued.	8						**v**						**v**		**v**

5. Curriculum of educational program

NON-PROFIT JOINT STOCK COMPANY
"KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY NAMED AFTER K.I. SATBAYEV"

SATBAYEV UNIVERSITY

«APPROVED»
Decision of the Academic Council
NPJSC«KazNRTU
named after K.Satbayev»
dated 06.03.2025 Minutes № 10

WORKING CURRICULUM

Academic year	2025-2026 (Autumn, Spring)
Group of educational programs	B064 - "Mechanics and metal working"
Educational program	6B07115 - "Technological machines and equipment (by industry)"
The awarded academic degree	Bachelor of engineering and technology
Form and duration of study	full time - 4 years

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	lek/lab/pr Contact hours	in hours SIS (including TSIS)	Form of control	Allocation of face-to-face training based on courses and semesters								Prerequisites
									1 course		2 course		3 course		4 course		
									1 sem	2 sem	3 sem	4 sem	5 sem	6 sem	7 sem	8 sem	
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)																	
M-1. Module of language training																	
LNG108	Foreign language		GED, RC	5	150	0.0/45	105	E	5								
LNG104	Kazakh (russian) language		GED, RC	5	150	0.0/45	105	E	5								
LNG108	Foreign language		GED, RC	5	150	0.0/45	105	E		5							
LNG104	Kazakh (russian) language		GED, RC	5	150	0.0/45	105	E		5							
M-2. Module of physical training																	
KFK101	Physical culture I		GED, RC	2	60	0.0/30	30	E	2								
KFK102	Physical culture II		GED, RC	2	60	0.0/30	30	E		2							
KFK103	Physical culture III		GED, RC	2	60	0.0/30	30	E			2						
KFK104	Physical culture IV		GED, RC	2	60	0.0/30	30	E				2					
M-3. Module of information technology																	
CSE677	Information and communication technology		GED, RC	5	150	30/15/0	105	E				5					
M-4. Module of socio-cultural development																	
HUM137	History of Kazakhstan		GED, RC	5	150	15/0/30	105	GE	5								
HUM132	Philosophy		GED, RC	5	150	15/0/30	105	E			5						
HUM120	Module of socio-political knowledge (sociology, political science)		GED, RC	3	90	15/0/15	60	E			3						
HUM134	Module of socio-political knowledge (cultural studies, psychology)		GED, RC	5	150	30/0/15	105	E				5					
M-5. Module of socio-cultural development																	
HUM136	Fundamentals of anti-corruption culture and law	1	GED, CCH	5	150	30/0/15	105	E			5						
MNG489	Fundamentals of economics and entrepreneurship	1	GED, CCH	5	150	30/0/15	105	E			5						
MSM500	Fundamentals of scientific research methods	1	GED, CCH	5	150	30/0/15	105	E			5						
MNG564	Basics of Financial Literacy	1	GED, CCH	5	150	30/0/15	105	E			5						
CHE656	Ecology and life safety	1	GED, CCH	5	150	30/0/15	105	E			5						
CYCLE OF BASIC DISCIPLINES (BD)																	
M-6. Module of physical and mathematical training																	
MAT101	Mathematics I		BD, UC	5	150	15/0/30	105	E	5								
MAT102	Mathematics II		BD, UC	5	150	15/0/30	105	E		5							MAT101

PHY468	Physics		BD, UC	5	150	15/15/15	105	E		5							
M-7. Module of basic training																	
GEN479	Engineering and computer graphics		BD, UC	5	150	15/0/30	105	E	5								
TEC549	Fundamentals of the specialty		BD, UC	5	150	30/0/15	105	E	5								
TEC571	Training workshops		BD, UC	4	120	0.0/45	75	E		4							
AAP173	Practical training		BD, UC	2				R		2							
GEN411	Theoretical and applied mechanics		BD, UC	5	150	30/15/0	105	E			5						
TEC463	Interchangeability, standardization and technical measurements		BD, UC	5	150	30/0/15	105	E			5						
TEC460	Construction materials processing machinery and equipment		BD, UC	5	150	30/15/0	105	E			5						
TEC563	Basics of hydraulics and hydraulic drives of technological machines		BD, UC	6	180	30/0/30	120	E				6					
GEN408	Strength of materials		BD, UC	5	150	15/15/15	105	E				5					
CSE831	Fundamentals of Artificial Intelligence		BD, UC	5	150	15/0/30	105	E				5					
PED436	Thermodynamics, heat transfer and heat engineering equipment		BD, UC	5	150	30/0/15	105	E					5				PHY111
GEN125	Bases of designing and details of cars		BD, UC	5	150	15/15/15	105	E					5				
ELC103	Electrotechnics and microelectronics		BD, UC	5	150	30/15/0	105	E					5				PHY112
TEC555	The dynamics and durability of technological machines		BD, UC	4	120	30/0/15	75	E					4				
PED445	Fundamentals of Research and Development	1	BD, CCH	5	150	30/0/15	105	E					5				MAT102
PED430	Technique of field experiment	1	BD, CCH	5	150	30/0/15	105	E					5				TEC193
TEC436	Methods and means of testing technological machines	1	BD, CCH	5	150	30/15/0	105	E					5				
MCH533	Inclusive engineering technologies	1	BD, CCH	5	150	30/0/15	105	E					5				
TEC401	Reliability of technological machines		BD, UC	5	150	30/0/15	105	E						5			
TEC485	Drilling machines and complexes	1	BD, CCH	5	150	30/0/15	105	E						5			
PED137	Technological lines and complexes of metallurgical production	1	BD, CCH	5	150	30/0/15	105	E						5			
MIN173	Mining technology	1	BD, CCH	5	150	15/0/30	105	E						5			MIN101
TEC471	Technological processes in the oil and gas industry	1	BD, CCH	5	150	30/0/15	105	E						5			
MNG562	Legal regulation of intellectual property	1	BD, CCH	5	150	30/0/15	105	E						5			
TEC469	Pumps, fans, compressors	2	BD, CCH	5	150	30/0/15	105	E						5			
TEC476	Internal combustion engines	2	BD, CCH	5	150	30/0/15	105	E						5			
PED175	Auxiliary transport equipment of metallurgical shops	2	BD, CCH	5	150	30/0/15	105	E						5			PHY112
TEC404	Technical audit	2	BD, CCH	5	150	30/0/15	105	E						5			PHY112
TEC477	Gas-pumping units	2	BD, CCH	5	150	30/0/15	105	E						5			
MNG563	Fundamentals of sustainable development and ESG projects in Kazakhstan	2	BD, CCH	5	150	30/0/15	105	E						5			
PED114	Computer-aided design of technological machines	3	BD, CCH	5	150	15/0/30	105	E						5			GEN101, MAT102
TEC409	Computer technologies for calculation, modeling and design	3	BD, CCH	5	150	30/0/15	105	E						5			PHY111, GEN101
TEC489	Calculation and design of technological machines and equipment	3	BD, CCH	5	150	15/0/30	105	E						5			
TEC578	Industrial safety		BD, UC	5	150	30/0/15	105	E							5		
CYCLE OF PROFILE DISCIPLINES (PD)																	
M-8. Module of professional activity																	
AAP102	Production practice I		PD, UC	2				R				2					
MSM129	Processes of machine-building production		PD, UC	5	150	30/15/0	105	E					5				
TEC566	Metal welding and cutting		PD, UC	4	120	30/15/0	75	E						4			
AAP187	Industrial internship II		PD, UC	2				R						2			
TEC466	Transportation vehicles	1	PD, CCH	5	150	30/0/15	105	E						5			

TEC127	Hydraulic machines and compressors in the oil and gas industry	1	PD, CCH	5	150	30/0/15	105	E						5			PED413, PHY112
TEC114	Lifting installations	1	PD, CCH	5	150	30/0/15	105	E						5			TEC121
TEC484	Equipment for ore preparation	1	PD, CCH	5	150	30/0/15	105	E						5			
TEC180	Repair of technological machines		PD, UC	6	180	30/0/15	135	E							6		TEC178
PED193	Instrumentation and automation of technological machines		PD, UC	5	150	30/0/15	105	E							5		PED190
TEC559	Installation and exploitation of technological machines		PD, UC	6	180	30/0/30	120	E							6		
TEC572	Friction and wear	1	PD, CCH	6	180	30/15/15	120	E							6		
TEC567	Lubrication of technological machines	1	PD, CCH	6	180	30/15/15	120	E							6		
TEC568	Fuels, oils and special liquids	1	PD, CCH	6	180	30/15/15	120	E							6		
TEC455	Melting processing equipment	2	PD, CCH	5	150	30/0/15	105	E							5		
TEC479	Oil and gas field machines and mechanisms	2	PD, CCH	5	150	30/0/15	105	E							5		
TEC106	Machines and equipment for gas and oil pipelines	2	PD, CCH	5	150	30/0/15	105	E							5		PED192
TEC483	Mining machinery and equipment	2	PD, CCH	5	150	30/0/15	105	E							5		
TEC570	Technical diagnostics of technological equipment		PD, UC	4	120	30/0/15	75	E								4	
PED431	Dewatering, fan and pneumatic plants	1	PD, CCH	5	150	30/0/15	105	E								5	
PED118	Dust-gas cleaning and recycling water supply of industrial enterprises	1	PD, CCH	5	150	30/15/0	105	E								5	PED1101
PED157	Well overhaul equipment and installations	1	PD, CCH	5	150	30/0/15	105	E								5	TEC109
PED454	Engineering and well workover technology	1	PD, CCH	5	150	30/0/15	105	E								5	TEC134
TEC418	Fundamentals of design of repair enterprises in the industry	2	PD, CCH	5	150	30/0/15	105	E								5	PHY112
PED170	Calculation and design of drilling equipment	2	PD, CCH	5	150	30/0/15	105	E								5	
PED155	Calculation and design of oil and gas equipment	2	PD, CCH	5	150	30/0/15	105	E								5	TEC134
PED177	Projection of metallurgical machines	2	PD, CCH	5	150	30/0/15	105	E								5	TEC141
PED421	Construction of mining transport vehicles and fixed installations	2	PD, CCH	5	150	30/0/15	105	E								5	TEC105
TEC548	Fundamentals of energy saving industry	3	PD, CCH	5	150	30/0/15	105	E								5	
TEC110	Equipment 3-5 redistribution	3	PD, CCH	5	150	30/0/15	105	E								5	TEC141
PED456	Energy-saving equipment and technologies in the oil and gas industry	3	PD, CCH	5	150	30/0/15	105	E								5	
TEC500	Fundamentals of energy saving in repair and service production	3	PD, CCH	5	150	30/0/15	105	E								5	
M-9. Module of final attestation																	
ECA103	Final examination		FA	8												8	
Additional type of training (ATT)																	
AAP500	Military training																
Total based on UNIVERSITY:									32	28	30	30	29	31	33	27	
									60		**60**		**60**		**60**		

Number of credits for the entire period of study

Cycle code	Cycles of disciplines	Credits			
		Required component (RC)	University component (UC)	Component of choice (CCH)	Total
GED	Cycle of general education disciplines	51	0	5	56
BD	Cycle of basic disciplines	0	91	20	111
PD	Cycle of profile disciplines	0	34	31	65
Total for theoretical training:		**51**	**125**	**56**	**232**
FA	Final attestation				8
TOTAL:					**240**

Decision of the Educational and Methodological Council of KazNRTU named after K.Satpayev. Minutes № 3 dated 20.12.2024

Decision of the Academic Council of the Institute. Minutes №3 dated 19.12.2024

Signed:	
Governing Board member - Vice-Rector for Academic Affairs	Uskenbayeva R. K.
Approved:	
Vice Provost on academic development	Kalpeyeva Z. B.
Head of Department - Department of Educational Program Management and Academic-Methodological Work	Zhumagaliyeva A. S.
Director of the Institute - A.Burkitbaev Institute of Energy and Mechanical Engineering	Yelemessov K.
Department Chair - Technological machines and equipment	Kaliyev B.
Representative of the Academic Committee from Employers ___Acknowledged___	Shukenov A. T.