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APPROVING
Director of the Institute
"Transport and Construction"
Abdreshev S.A.
«28» ___02___ 2025

CATALOG OF DISCIPLINES OF THE UNIVERSITY COMPONENT

EDUCATIONAL PROGRAMS **6B07138-Mechanical engineering**

Education level: Bachelor's degree **Duration of study: 3 years** **Year of admission: 2025**

Module	Cycle	Component	Name of the discipline	Total labor intensity		Term	Learning outcomes	Brief description of the discipline	Prerequisites	Post-requirements
				in academic hours	in academic credits					
1	2	3	4	5	6	7	8	9	10	11
Module of natural science competencies	BD	UC	Engineering Mathematics 1	150	5	1	ON9	The discipline "Engineering Mathematics 1" studies the basic concepts of higher mathematics and its applications. The course sections include elements of linear algebra and analytical geometry, an introduction to mathematical analysis, and differential calculus of functions of one and several variables. The purpose of the course is to master the mathematical apparatus for solving theoretical and applied problems of a specific profile, to gain an understanding of mathematical modeling, and to develop analytical and systems thinking, which makes it possible to effectively solve engineering problems. The discipline uses interactive teaching methods and performing computational and graphical work.	Basic school knowledge in mathematics	Electrical engineering and the basics of electronics, Machine parts and design basics Fundamentals of calculating the strength of machines and mechanisms
	BD	UC	Engineering Mathematics 2	150	5	2	ON9	The formation of students' mathematical knowledge and skills necessary for the study of related natural science disciplines, disciplines of the professional	Basic school knowledge in mathematics	Electrical engineering and the basics of

Module of natural science competencies								cycle and skills of mathematical modeling and research in professional activities. The course sections include integral calculus of functions of one and several variables, ordinary differential equations, and series theory. Special attention is paid to the application of mathematical methods to solve engineering problems.		electronics, Machine parts and design basics Fundamentals of calculating the strength of machines and mechanisms
	BD	UC	Applied Physics	150	5	2	ON9	Formation of skills using fundamental laws, theories of classical and modern physics, as well as methods of physical research, thinking, scientific worldview, in independent cognitive activity, to be able to model physical situations using computer technology and ideas about the modern natural science picture of the world.	Basic school knowledge in physics	Electrical engineering and fundamentals of electronics, Theoretical mechanics, Fundamentals of calculating the strength of machines and mechanisms
	BD	UC	Theoretical mechanics	120	4	2	ON2	Formation of scientific engineering thinking. To familiarize with the basic concepts, laws and theorems that make it possible to compose equations describing the behavior of mechanical systems, the ability to record a specific phenomenon in mathematical form, the use of basic methods of mechanics in the study of motion and equilibrium of mechanical systems in the study of disciplines of the professional cycle. Methods of active learning – the use of interactive tools, the performance of individual calculation and graphic works. The form of control is an oral exam and the defense of calculation and graphic works.	Engineering Mathematics 1,2, Applied Physics 1,2	Machine parts and design basics, Applied Mechanics, Fundamentals of calculating the strength of machines and mechanisms
	BD	UC	Structural materials in transport engineering	120	4	1	ON2	Studies the structure, properties and labeling of metals and non-metallic materials, methods of their application and principles of material processing by modern methods, classification of structural and raw materials, methods of testing materials, operational reliability and durability of transport equipment. Within the framework of the discipline, interactive	Applied Physics, Engineering Mathematics	Machine parts and design basics Design and production of blanks

Professional module								teaching methods and the computational and graphical method are used.		
	BD	UC	Electrical engineering and the basics of electronics	180	6	3	ON5	The discipline considers electrical circuits of direct, alternating and three-phase currents, the principle of operation and purpose of a transformer and electrical machines, methods of measuring electrical quantities, application and general rules of operation of semiconductor devices and circuits. Teaching methods - analysis of specific situational tasks, group discussions.\	Applied Physics	Machine parts and design basics, Labor protection, Cutting tools
Professional module	BD	UC	Occupational health and safety	150	5	8	ON6	Formation of knowledge and skills necessary to ensure safe working and living conditions. The legal and organizational foundations of occupational safety, methods of occupational risk assessment and management, means of individual and collective protection, emergency prevention, as well as measures to prevent injuries and occupational diseases are studied. Special attention is paid to the creation of a safe working environment, compliance with labor protection standards and requirements, as well as the formation of a safety culture in professional activities.	Ecology and life safety	Machine parts and design basics, Mechanical engineering technology, Technological processes in mechanical engineering
	BD	UC	Machine parts and design basics	150	5	4	ON2	Studies the basics of theory, calculation and design of general-purpose machine parts and assemblies, mechanical gears, joints, shafts and axles, bearings and couplings, machine drives, standards and professional standards in the design of assemblies, features and characteristics of structural materials and manufacturing technologies for machine parts. The discipline uses interactive teaching methods, open and closed tests.	Engineering Mathematics 1,2, Applied Physics 1,2 Theoretical Mechanics	Operation and repair of technological equipment, Cutting tools, Design and production of blanks
Information Technology and Artificial Intelligen	BD	UC	Engineering graphics and computer modeling	120	4	1	ON4 ON10	The course covers the principles of technical drawing and engineering graphics, as well as modern 3D modeling methods using specialized software, aimed at developing skills in designing and visualizing technical objects, creating digital models and diagrams, drafting, modeling structures, and analyzing their parameters for solving engineering problems.	Basic school knowledge in computer science, Information and communication technologies	Digital manufacturing and additive technologies, Automation of production processes and robotics

ce Module Information Technology and Artificial Intelligence Module	BD	UC	Basics of Python Programming	90	3	2	ON10	The discipline studies the syntax and semantics of the Python language, algorithmization and program design, program structuring and solving problems related to artificial intelligence, learns machine learning, data processing and intelligent system development methods, and analyzes the use of AI in various fields, forming professional competencies in programming and the basics of artificial intelligence.	Basic school knowledge of English, Computer and engineering modeling	Fundamentals of artificial intelligence, Computer-aided design systems in mechanical engineering. Automation of production processes and robotics Technology of processing on machines with numerical control
Practice-oriented module	BD	UC	Professionally oriented foreign language	90	3	6	ON3	Formation and development of professional communicative competence in a foreign language necessary for professional activity, proficiency in a professional foreign language for written and oral information exchange, development of skills in reading and understanding professional literature on their specialty in a foreign language, development of the ability to express their thoughts orally and in writing in situations of professional and business communication.	Basic school knowledge, Foreign language	Computer-aided design systems in mechanical engineering Digital manufacturing and additive technologies, Automation of production processes and robotics
	BD	UC	Educational practice	60	2	3	ON 3, ON 5, ON 7, ON 8	The organization of educational practice is aimed at providing bachelors with familiarization with the main directions, objects, areas of professional activity and profiles of training and consolidation of theoretical material, as well as visiting a branch of the department according to this educational program. Form of control - protection of the report	Computer and engineering modeling	Digital manufacturing and additive technologies Computer-aided design systems in mechanical engineering

										Automation of production processes and robotics
Professional module	PD	component of choice	Design and calculation of technological equipment	180	6	5	ON4 ON11	Studies the elements of devices, their purpose and design methods, selection of types and structures of devices, their necessary calculations, methods of designing technological equipment and tools, execution of drawings using computer technology in the AutoCAD system. Interactive teaching methods are used within the framework of the discipline.	Design and production of blanks Automatic design systems in mechanical engineering Digital manufacturing and additive technologies	Final certification
	PD	UC	Design and production of blanks	150	5	5	ON4 ON11	The course "Design and Production of Blanks" focuses on methods for designing, selecting materials, and manufacturing technologies for machine part blanks. It includes calculation of technological parameters, economic efficiency analysis, and selection of equipment and tooling. The course develops professional competencies in production preparation and improving the quality of mechanical engineering products	Applied Physics 1,2. Engineering Mathematics 1,2. Theoretical Mechanics Structural materials in transport engineering	Technological processes in mechanical engineering, mechanical engineering technology, Fundamentals of engineering enterprises design
	PD	component of choice	Design of technological processes for machine tools	180	6	8	ON4 ON11	Studies methods of designing and programming technological processes of machining parts on CNC machines, methods and means of developing technological processes and developing control programs for machining parts on CNC machines, the possibilities of modern computer technology and CAD\CAM systems. Within the framework of the discipline, interactive teaching methods and the computational and graphical method are used.	The basics of artificial intelligence Computer-aided design systems in mechanical engineering Digital manufacturing and additive technologies	Final certification

Practice-oriented module Practice-oriented module	PD	UC	Fundamentals of foundry production and equipment	150	5	5	ON12	The discipline "Fundamentals of Foundry Production and Equipment" studies the processes of obtaining metal products by pouring molten materials into molds. It examines casting technologies, material properties, mold designs, types of melting furnaces, and foundry equipment. This knowledge is applied in the design, manufacturing, and quality control of cast products	Mechanical engineering technology	Technological processes of mechanical engineering production
	PD	UC	Production practice 1	150	5	6	ON1-ON11	The main objectives of industrial practice are: consolidation of theoretical knowledge and practical skills according to the chosen educational program in production conditions, acquisition of organizational work experience, obtaining a working specialty, formation of practical skills and competencies in the process of mastering the bachelor's program. It is conducted in the practice bases at enterprises according to this educational program.	Basic and core disciplines of the OP	Methods of scientific research; Final certification
	PD	UC	Production practice 2/Industrial Pre-graduation Internship	150	5	9	ON1-ON11	The main objectives of industrial practice are: consolidation of theoretical knowledge and practical skills according to the chosen educational program in production conditions, acquisition of organizational work experience, obtaining a working specialty, formation of practical skills and competencies in the process of mastering the bachelor's program. It is conducted in the practice bases at enterprises according to this educational program.	Core disciplines of the OP	Methods of scientific research; Final certification
	Total			**2490**	**83**					