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| JSC «K.Kulazhanov KazUTB» | EP 25/01-11-2025 |  |
| Educational program | Edition 4 | |

EDUCATIONAL PROGRAM

6B07119 Technological machines and equipment (by industry)

Level: *bachelor's*




Approved
by the Board of Directors of JSC
«K.Kulazhanov KazUTB» "02" 09 20 25
protocol No. 3

Recommended
by the Academic Council of JSC
«K.Kulazhanov KazUTB» "28" 03 20 25
protocol No. 8


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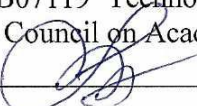
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Preface

The educational program "6B07119 Technological machines and equipment (by industry)" was developed in accordance with the State Compulsory Standard of Higher Education / Postgraduate Education, approved by the order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2, as well as on the basis of the professional standard approved by order of the Acting Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 1 dated December 30, 2019. Conducting tests, Appendix No. 27 dated 07.08.2023 No. 125.

The educational program "6B07119 Technological machines and equipment (by industry)" was approved at the meeting of the Council on Academic Quality on "27" 05 20 25, protocol No. 4
Chairman Baibolova L.K. 

The educational program "6B07119 Technological machines and equipment (by industry)" was approved at the meeting of the Commission on Academic Quality of the Faculty on "29" 11 20 24, protocol No. 2
Chairman Zhunussova G.S. 

The educational program "6B07119 Technological machines and equipment (by industry)" was developed and discussed at the meeting of the department "Technology and standardization" dated "21" 10 20 24, protocol No. 3
Head of the department Baitukenova S.B. 

Approval sheet

Educational program "6B07119 Technological machines and equipment (by industry)"
(code and name of the EP)

AGREED:

Vice-Rector for
Administrative Affairs




E. Askarbekov

" 27 " 03 2025 year

Head of Educational
Programs Department


PP

B. Bayadilova

" 27 " 03 2025 year

Chairman
ALE «Association of Halal
Industry of Kazakhstan»
Astana


PP

M. Sarsenbayev

" 21 " 10 2024 year

Director
«Barys «RA» LLP,
Astana


PP

S. Khairlieva

" 21 " 10 2024 year

Director
LLP «NURLI LTD»
Astana


PP

A. Mukanova

" 21 " 10 2024 year

Director
«Darejani» LLP,
Astana


PP

A. Uzakbaeva

" 21 " 10 2024 year

Director
«STROY ENGINEERING
NT» LLP,
Astana


PP

N. Kozhakhmetova


" 21 " 10 2024 year

Student TME-232



A. Urazaliev

" 21 " 10 2024 year


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1 Passport of the educational program

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| International Standard Classification of Education (ISCED) level | 6 |
| National Qualification Framework (NQF) level | 6 |
| Sectoral Qualifications Framework (SQF) level | 6 |
| Code and name of the field of education | 6B07 Engineering, manufacturing and construction industries |
| Direction of training | 6B071 Engineering and Engineering affairs |
| Number and name of the group of educational programs | B064 Mechanics and metal working |
| Code and name of the educational program (EP) | 6B07119 Technological machines and equipment (by industry) |
| Educational program profile | Higher engineering education |
| Goal of the educational program | Preparation of highly qualified, competitive bachelors in the field of automation and mechanization of technological processes for public catering enterprises, food and processing industry in the field of maintenance, operation, repair of equipment, aggregates, machines and apparatuses, as well as those who have the skills of designing and mastering modern technology |
| Completion criterion of an educational program | 240 academic credits |
| Language of instruction of the educational program | Russian, Kazakh |
| Distinctive features of the educational program | No |
| Partner University | No |

2 Qualification characteristics of a graduate of an educational program


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| Degree awarded | Bachelor of Engineering and Technology in the educational program "6B07119 Technological machines and equipment (by industry)" |
| Field of professional activity | Production, management, research, education |
| Types of professional activities | <ul style="list-style-type: none"> - design and calculation; - production and technological; - experimental and research; - organizational and managerial; - installation and adjustment; - service and operational in the field of food and processing industries. |
| Object of professional activity | Enterprises of dairy, meat, canning, bakery, confectionery, brewing, sugar refining, pasta, flour milling and other branches of public catering. Design organizations, research institutes, companies and firms of various forms of ownership |

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| Functions of professional activity | <ul style="list-style-type: none"> - Operation and maintenance of machines and equipment; - control and supervision of the quality of repair work; - ensuring the uninterrupted operation of machines and equipment, calculating their main characteristics and operational parameters in connection with the design of new or reconstruction of existing equipment; - preparation and formation of current and long-term scheduled preventive maintenance of production lines, technical maintenance and repair of machines, equipment, modernization programs and technical equipment; - research of food and processing equipment for various technological purposes in order to assess its reliability and performance; - development and approval of a technical project for the creation of an innovative development related to equipment testing and its implementation into operation, as well as preparation of technical documentation; - analysis of technical specifications and preparation for technical design and systematization of necessary information, technical data, indicators and work results. Carrying out necessary calculations using modern computer tools; - conducting conformity assessment, monitoring the compliance of developed projects and technical documentation with standards and technical conditions. |
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3 Requirements for the content of the educational program

| Name of cycles and disciplines | Workload in academic credits |
|---|------------------------------|
| Cycle of general education disciplines (GED) | 56 |
| Required component | 51 |
| University component | 5 |
| Cycle of basic disciplines (BD) | 89 |
| University component | 33 |
| Component of choice | 49 |
| Professional practice | 7 |
| Cycle of major disciplines (MD) | 87 |
| University component | 10 |
| Component of choice | 65 |
| Professional practice | 12 |
| Final assessment | 8 |
| Total | 240 |

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4 Additional educational programs (minor)

4.1 Minor «Modern aspects of the application of artificial intelligence»

| Name of disciplines | Workload in academic credits |
|---|------------------------------|
| Introduction to Artificial Intelligence | 5 |
| Development of artificial neural networks | 5 |
| Artificial intelligence in the management of object | 5 |
| Total | 15 |

5 Competency map of the educational program "6B07119 Technological machines and equipment (by industry)"

| Competence map of the educational program | Learning outcome code | Learning Outcome (according to Bloom's Taxonomy) |
|---|-----------------------|--|
| Behavioral skills and personality traits (Softskills) | LO00K1 | Demonstrates knowledge in the field of social sciences and humanities, forming a personality with a wide outlook and culture of thinking. |
| | LO00K2 | Demonstrates knowledge of trends in the social development of society and socio-ethical values based on social norms, traditions, customs and is guided by them in various social situations and in professional activities |
| | LO1 | Forms competencies in the field of economics, law, the basics of anti-corruption culture, entrepreneurship skills and financial literacy for effective energy and waste management in making management and technical decisions. |
| Digital competencies (Digital skills) | LO00K3 | Applies digital technologies, tools, basic methods and theories in solving professional problems, and also demonstrates knowledge of Kazakh, Russian and foreign languages to solve problems of interpersonal and intercultural interaction. |
| | LO2 | Applies fundamental natural science and engineering knowledge in professional activities, providing calculation, design and optimization of technical solutions |
| | LO3 | Analyzes the principle of operation, design features and technical characteristics of technological equipment for the correct selection, operation and maintenance in accordance with the requirements of the production process |
| | LO4 | Defines the relationship between equipment design and functionality in different processes to optimize operation and improve the efficiency of production systems |
| | LO5 | Uses software, digital tools and intelligent technologies to simulate and calculate the parameters of technological |

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| | | machines aimed at automating and optimizing machine-building processes. |
| Professional skills (Hardskills) | LO6 | Analyzes the causes of possible equipment malfunctions, identifying weaknesses in structures and operating modes to develop measures to improve reliability, extend service life and minimize downtime in production processes |
| | LO7 | Ensures the safety and quality of food products by designing technological equipment that meets environmental and metrological standards |
| | LO8 | Performs commissioning of process equipment, including parameter setting and test runs, ensuring compliance with technical characteristics and safety requirements. |
| | LO9 | Designs process equipment taking into account the requirements of energy efficiency, reliability, safety and quality, ensuring compliance of design solutions with production tasks, regulatory documents and technical operation requirements. |

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6 Learning outcomes of the educational program and modules

| Key competencies | Learning Outcomes (LO) for the educational program | Name of module | Learning outcomes for the module | Name of disciplines that form learning outcomes |
|---|---|---|---|---|
| Behavioral skills and personality traits (Softskills) | <p>LO00k1 Demonstrates knowledge in the field of social sciences and humanities, forming a personality with a wide outlook and culture of thinking.</p> <p>LO00k2 Demonstrates knowledge of trends in the social development of society and socio-ethical values based on social norms, traditions, customs and is guided by them in various social situations and in professional activities</p> | Self-education and personal development | <p>Demonstrates an understanding of the role of physical culture in preserving health and maintaining optimal professional performance</p> <p>Demonstrates knowledge of trends in the social development of society and socio-ethical values based on social norms, traditions, customs and is guided by them in various social situations and in professional activities.</p> <p>Demonstrates knowledge of the history of Kazakhstan and philosophy as a special form of knowledge of the world and forms a personality with a wide outlook and culture of thinking.</p> | <p>Physical Culture</p> <p>Module of socio-political knowledge (political science, sociology, cultural studies, psychology)</p> <p>Philosophy</p> <p>History of Kazakhstan</p> |
| | <p>LO00k3 Applies digital technologies, tools, basic methods, theories in solving professional problems, and also demonstrates knowledge of Kazakh, Russian and foreign languages to solve problems of interpersonal and intercultural interaction</p> | Information and communication | <p>Able to classify software, use it for its intended purpose, restructure and interpret, if necessary, as well as manage software products developed by himself</p> <p>Develops the ability to interpersonal social and professional communication in the state, Russian and foreign languages</p> | <p>Information and communication technologies</p> <p>Foreign language</p> <p>Kazakh (Russian) language</p> |
| | <p>LO1 Forms competencies in the field of economics, law, the basics of anti-corruption culture, entrepreneurship skills and financial literacy for effective energy and waste management in making management and technical decisions.</p> | Self-education and personal development | <p>Applies in professional activity knowledge of economics and law, as well as entrepreneurial skills and financial literacy, using key economic and legal principles, financial awareness and demonstrating civic responsibility in behavior.</p> | <p>Module of economics, entrepreneurship, law and financial literacy (fundamentals of economics and entrepreneurship, basics of law and anti-corruption culture, basics of financial literacy)</p> <p>Economics and enterprise planning</p> |
| | | Economy and production | He is able to analyze the production level, evaluate the efficiency of the enterprise, develop cost planning strategies | |



| Digital competencies (Digital skills) | | |
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| <p>and optimize business processes to increase the competitiveness and sustainability of the enterprise in the market.</p> <p>Analyses and evaluates the extent to which sustainable development principles are integrated into national strategies and business processes, including waste management, ecosystem restoration, ONS risk reduction, green economy investments, energy efficient technologies, as well as the impact of these factors on quality of life, education and compliance with international environmental standards.</p> <p>By acquiring the skills to participate in quality control processes and optimize quality control of finished products, able to implement a quality management system in production, control and compliance with regulatory requirements at all stages of production.</p> <p>Demonstrates knowledge of the basic technical and design characteristics of products, principles and methods for assessing their quality management, as well as the specifics of choosing quality indicators.</p> <p>Applies methods of searching for sources containing scientific, technical and patent information. Able to process the results obtained, analyze and comprehend them taking into account the available data.</p> <p>Applies methods of searching for sources containing scientific, technical and patent information. Able to process the results obtained, analyze and comprehend them taking into account the available data.</p> <p>Understands fundamental physical laws and their application in technology; is able to apply methods of physical measurements, modeling and analysis to solve engineering problems, develop and operate technical systems and devices.</p> <p>Explains the properties of chemical elements from the position of the electronic structure of the atom and its position in the periodic system of chemical elements; compares the structure,</p> | | <p>Sustainable development, ecology and life safety</p> <p>Quality management system / Quality management of mechanical engineering products</p> <p>Patentology</p> <p>Higher mathematics</p> <p>Physics</p> <p>General chemistry / Organic and inorganic chemistry</p> |
| | <p><u>Engineering</u></p> <p><u>Natural sciences</u></p> | |
| <p>LO2 Applies fundamental natural science and engineering knowledge in professional activities, providing calculation, design and optimization of technical solutions</p> | | |



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| | <p>LO3 Analyzes the principle of operation, design features and technical characteristics of technological equipment for the correct selection, operation and maintenance in accordance with the requirements of the production process</p> | <p><u>Engineering</u></p> | <p>physical and chemical properties of metals and nonmetals and their compounds, methods of extraction. Describes the processes occurring in solutions: electrolytic dissociation, hydrolysis, redox reactions and electrochemical processes; Compares the structure, physical and chemical properties, and methods of producing metals and nonmetals; Explains the mechanism of transformation of organic compounds and the relationship between the structure and reactivity of organic compounds. Applies methods of searching for sources containing scientific and technical information for the design of educational and research works. Using methods of calculations for the strength and rigidity of structural elements, describes the kinematic diagrams of mechanisms and types of mechanical transmissions. Performs verification and design calculations of structural elements and machine parts for strength, rigidity and stability under various types of deformation. Has the skills to determine the geometric and kinematic characteristics of the mechanical movement of parts in assemblies and mechanisms, is competent in the selection and calculation of machine parts. By calculating machine parts and assemblies, he is able to correctly select structural materials and structural forms that ensure high reliability, durability, efficiency and safety of structures and equipment components. Has the skills of calculation and design of lever, gear, cam mechanisms, rotational motion mechanisms. Is able to assess the technical condition of the machine, perform basic calculations and compile the necessary technical documentation, Has practical skills in assembling technological equipment. Forms an idea of future professional activities, applies the</p> | <p>Educational and research work of the student</p> <p>Theoretical and applied mechanics</p> <p>Strength of materials</p> <p>Design principles / Machine parts</p> <p>Theory of mechanisms and machines</p> <p>Process equipment (by industry)</p> <p>Educational practice</p> |
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| <p>LO4 Defines the relationship between equipment design and functionality in different processes to optimize operation and improve the efficiency of production systems</p> | <p><u>Calculation and design</u></p> | <p>acquired theoretical knowledge in practice, acquires the first skills in research activities.</p> <p>Knowing the purpose, scope, classification, principle of operation of machines and devices, the student is able to choose the mode of the technological process in production, with minimal cost and high quality of production of finished products.</p> <p>Describes the basic principles of operation of technological machines and equipment, their design features and technical characteristics</p> <p>The student is able to select designs, carry out calculations of machines and devices for certain technological processes, calculating the service life of machines and devices, thereby increasing productivity at minimal costs and high quality of finished products.</p> <p>Able to classify food production processes into classes, groups and types, demonstrating knowledge of the theoretical foundations of calculating mass transfer and heat transfer processes and describing their purpose.</p> <p>It is able to classify food production processes by classes, groups and types, demonstrating knowledge of the theoretical foundations of calculating hydromechanical and mechanical processes.</p> <p>Students are able to design hydraulic and gas systems, carry out engineering calculations based on them, using methods for solving problems in fluid mechanics.</p> <p>Is capable of independently solving problems related to the method of controlling the automation of the technological production system and automation tools, taking into account the requirements of the technological process and occupational safety.</p> <p>He studies the activities, structure of the enterprise, purpose, classification, structure and principle of operation of technological machines, safety precautions in direct</p> | <p>Processes and vehicles of food productions / Machinery and equipment of hydro-mechanical processes of food production</p> <p>Machines and apparatuses of processing industries / Machines and equipment for heat and mass transfer processes of food production</p> <p>Hydropneumatic machines and drives / Fluid and gas mechanics, hydraulic and pneumatic drive</p> <p>Automation of technological processes in the industry</p> <p>Industrial practice I</p> |
|--|--------------------------------------|---|---|



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| <p>LO5 Uses software, digital tools and intelligent technologies to simulate and calculate the parameters of technological machines aimed at automating and optimizing machine-building processes</p> | <p><u>Technological</u></p> | <p>production, which will make it possible to better navigate the profession.</p> <p>When studying the discipline, students apply technical ideas using computer graphics software to model and build 3D objects, diagrams and other technical documents.</p> <p>Develops and programmatically implements an artificial intelligence system, designs artificial intelligence systems, uses the most important concepts and terms of machine learning and neural network theory, and uses cloud technologies for data processing.</p> <p>By developing and applying automated control systems for the production process and the general engineering control system, making calculations and knowing their mechanical properties of structural materials, he designs new standard parts and assembly units for general-purpose machines.</p> <p>He is able to work with modern software products for the creation and analysis of projects, as well as the effective use of automated tools to optimize design processes and improve the quality of finished products.</p> <p>It is able to work with various aspects of automation and optimization of metalworking processes to improve production efficiency and product quality.</p> <p>Uses software tools to create and test artificial intelligence models in real-world projects, including integrating models into practical applications.</p> <p>Knows the ethical principles and standards that should govern the development of artificial intelligence. He is capable of organizing the work of a team and setting the task of creating new products in the field of artificial intelligence and adapting existing ones to the requirements of digital transformation of companies.</p> <p>Using computer modeling, he finds optimal engineering solutions in the design of structural parts and assemblies, performing engineering calculations for strength, reliability of</p> | <p>Engineering and computer graphics</p> <p>Development of artificial neural networks</p> <p>Mechanics of robotic systems</p> <p>Computer-aided design system / The theory of automatic control in metalworking</p> <p>Introduction to Artificial Intelligence</p> <p>Artificial intelligence in the management of object</p> <p>Design of machine parts by computer simulation methods</p> |
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| Professional skills (Hardskills) | | structural elements and mechanisms, and material selection for the action of external forces. | Industrial practice forms practical skills and abilities in installation, maintenance, repair, adjustment of equipment at food and processing enterprises. | Industrial practice 2 |
| | LO6 Analyzes the causes of possible equipment malfunctions, identifying weaknesses in structures and operating modes to develop measures to improve reliability, extend service life and minimize downtime in production processes | <u>Production</u> | Develops skills of independent selection of material and evaluation of its qualitative parameters, selection of tools, equipment and devices for obtaining and processing a workpiece or a machine-building product, forecasting possible defects. | Materials Science / Structural materials and heat treatment |
| | | | The student performs calculations of reliability indicators of machines and equipment, determining the optimal reliability parameters for the operational performance of technological machines. | Quality and reliability of technological machines / Testing and testing equipment |
| | | | Knowing the methodology and technology of testing for the effects of mechanical, climatic and biological factors is able to assess the quality of products or equipment. | |
| | | | The student using AI technologies is able to determine the state of the equipment in operation and assess when maintenance should be carried out in fact. | Predictive diagnostics in mechanical engineering / Technical diagnostics of technological equipment |
| | | | Able to develop rules using methods and tools necessary for monitoring and diagnosing equipment in the food and processing industry, choosing a method to improve the reliability of process equipment. | |
| | | | Knowing the technological process of manufacturing and repairing technological machines and equipment is able to determine the cause of damage to the parts of the mechanism and its replacement. | Repair of technological machines |
| | LO7 Ensures the safety and quality of food products by designing technological equipment that meets environmental and metrological standards | <u>Calculation and design</u> | The student is able to give an opinion when drawing up a document for certification on the research carried out on raw materials and finished products. It is able to carry out product safety measures using measuring instruments in order, determining the composition of product quality indicators and using methods for analyzing product | Fundamentals of food production technology / Safety and quality of food |

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| | quality data and ways to find the causes of defects. Demonstrates knowledge of verification, calibration, metrological certification of measuring instruments, analysis of the measurement scheme of various physical quantities, processing of measurement results and analysis of their reliability, measurement errors. Applies theoretical and practical knowledge of control and measuring equipment, uses regulatory documents for verification and calibration of measuring instruments, and also processes measurement results, characterizes standards, determines the type of measurement, etc. He has the ability to collect information, choose the optimal solution when designing equipment, and perform calculations when designing standard components of technological equipment to improve product quality. Knows how to work with methodological and regulatory materials, technical conditions and standards of technological design, calculations and selection of equipment. | Metrological ensuring production / Metrology |
| LO8 Performs commissioning of process equipment, including parameter setting and test runs, ensuring compliance with technical characteristics and safety requirements. | <u>Production</u> Knows the rules of safety, the procedure for briefing, training employees, and developing measures to minimize hazards. Capable of preventing accidents and minimizing possible losses to develop an operational plan for all types of activities related to research, development, design, construction, implementation and management of technological processes and productions. By observing electrical safety in production, he is able to participate in the development and implementation of energy and resource conservation measures in production using electrical equipment. He is able to participate in the organization of the process of product development and manufacture in production, the means of their technologies for implementation and automation, the choice of technologies for the implementation of the processes of design, manufacture, diagnosis and software testing of products. | Calculation and design of food production machines and apparatuses / Energy-saving technologies in the food industry Safety measures at processing plants / Industrial safety Electrical Engineering / Automation |



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| | <p>LO9 Designs process equipment taking into account the requirements of energy efficiency, reliability, safety and quality, ensuring compliance of design solutions with production tasks, regulatory documents and technical operation requirements.</p> | | <p>He is able to make a technological map of the installation and restoration of technological machines, to make forecasts to ensure reliable and productive work in various production conditions</p> <p>Pre-graduate/ Industrial practice practically forms the skill of conducting research related to the topic of the student's FQW (final qualification work), the ability to use the experience gained in production to make decisions on organizational and technological tasks at food and processing enterprises.</p> <p>Demonstrates knowledge on optimization of technological processes of material processing by methods of experiment planning;</p> <p>Seeks opportunities to reduce the cycle of work, helps to provide the company's departments with the necessary technical data, documents, materials, and equipment.</p> <p>Demonstrates skills in solving modern heat exchange problems by conducting thermal calculations, solving practical problems related to energy saving of natural resources, materials during operation, repair and maintenance of transport and technological machines for various purposes, their units, systems and elements.</p> <p>Performs technological calculations of machines and apparatuses according to the design or reconstruction of production equipment, arranging the equipment taking into account the flow of the technological process.</p> <p>Applies in practice standards, principles, methods, types of regulatory documentation for certification and standardization procedures in the field of mechanical engineering.</p> <p>Using the general principles of building a unified system of tolerances and landings, designations on drawings of landings and qualities, performs calculations on engineering drawings during the manufacture of parts.</p> <p>Able to work with the requirements of regulatory documents, knowledge of which is necessary for the design, construction</p> | <p>Installation and operation of technological machines</p> <p>Pre-graduate practice/ Industrial practice</p> <p>Engineering technology</p> <p>Heat engineering</p> <p>Design of technological machines and apparatuses</p> <p>Standardization and certification in mechanical engineering / Interchangeability, standardisation and technical measurements</p> <p>Aspiration and ventilation units of processing plants /</p> |
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| | and operation of these systems. Is able to carry out a rational selection of regulatory requirements for air in the food and processing industry, organize its proper operation, ensure the effective use of ventilation and aspiration systems equipment, determine and bring control of microclimate parameters to optimal operating modes. Acquires knowledge of the operating principles of refrigeration equipment, methods of its operation and maintenance, as well as skills in the rational use of refrigeration technologies to ensure the quality and safety of food products. Able to assess the technical condition of the heating and cooling system and refrigeration machine, performing basic calculations and drawing up the necessary technical documentation. | Ventilation and air conditioning systems for food production |
| Final | Understands the goals, methodology and methods of professional activities of a mechanical engineer, manager, foreman of the production of machinery and equipment. Able to apply the acquired skills to continue further training in the profile of the educational program under study. | Refrigeration equipment and technology / Refrigerating machines and heat and cooling systems |
| | | Final assessment |

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7 The relationship between the attainability of the formed learning outcomes according to the educational program and academic disciplines

| № | Name of the discipline | Brief description of the discipline | Number of credits | Formed learning outcomes (codes) | | | | | | | | | | | | | |
|--|--|---|-------------------|----------------------------------|-------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| | | | | LO001 | LO002 | LO003 | LO1 | LO2 | LO3 | LO4 | LO5 | LO6 | LO7 | LO8 | LO9 | | |
| Cycle of general education disciplines Required component | | | | | | | | | | | | | | | | | |
| 1. | History of Kazakhstan | The program consists of five thematic blocks: Ancient people, the formation of nomadic civilization, Turkic civilization and the Great Steppe, Kazakhstan in the new era (XVIII-early XX centuries) Kazakhstan in the Soviet period, Independent Kazakhstan. The purpose of the discipline is to provide objective knowledge about the main stages of the development of the history of Kazakhstan from ancient times to the present. | 5 | + | | | | | | | | | | | | | |
| 2. | Philosophy | This program is aimed at studying the updated content of the general education discipline "Philosophy," the formation of students' openness of consciousness, understanding of their own national code and national identity, spiritual modernization, competitiveness, realism and pragmatism, independent critical thinking, the cult of knowledge and education, on assimilation of such key worldview concepts as justice, dignity and freedom, as well as the development and strengthening of the values of tolerance, intercultural dialogue and culture of peace. | 5 | + | | | | | | | | | | | | | |
| 3. | Physical culture | This program is aimed at studying the general education discipline "Physical Culture," which provides physical training in accordance with world education standards. The program defines the joint cooperation of the teacher and the student in the process of physical education throughout the training in the context of the requirements for the level of mastery of the discipline. | 8 | + | | | | | | | | | | | | | |
| 4. | Socio-political Knowledge Module (Psychology, Culture and Political) | This program involves the study of four scientific disciplines - sociology, political science, cultural studies, psychology, each of which has its own subject, terminology and research methods. Interactions between these scientific disciplines are carried out on the basis of the principles of information complementarity; integrativeness; the methodological integrity of the research approaches of these disciplines; commonality of results-based learning methodology; a single system representation of the typology of learning outcomes as formed abilities. | 8 | + | | | | | | | | | | | | | |



| and personal financial management | | | | | | | | | | | | | | | | | | |
|---|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Cycle of basic disciplines | | | | | | | | | | | | | | | | | | |
| University component/Elective component | | | | | | | | | | | | | | | | | | |
| entrepreneurship. Fundamentals of law and anti-corruption culture. Ecology and life safety) | | | | | | | | | | | | | | | | | | |
| 9. Theoretical and applied mechanics | The purpose of the discipline is to study the knowledge and skills of the basic laws of mechanics, general laws of mechanical motion of material points and mechanical systems. Students have basic skills in methods of studying the equilibrium and motion of mechanical systems, the principles of mechanics in building computational circuits that allow analyzing, modeling and solving production tasks | 5 | | | | | | | | | | | | | | | | |
| 10. Strength of materials | The purpose of the discipline is the development and application of methods for calculating machine parts and their elements in the development of engineering structures. Students have basic skills in methods of studying the balance and motion of mechanical systems, as well as mechanical principles of building computational diagrams that allow analyzing, modeling and solving production problems | 5 | | | | | | | | | | | | | | | | |
| 11. Economics and enterprise planning | The course is aimed at studying the basics of economics and enterprise planning, developing skills to assess the technical and economic level of production, analyzing product quality indicators and the effectiveness of the enterprise. Students master the methods of planning resource and labor costs, as well as develop strategies to increase productivity, optimize business processes and increase competitiveness in order to achieve maximum efficiency and sustainability of the enterprise in market conditions | 3 | | | | | | | | | | | | | | | | |
| 12. Sustainable development, ecology and life safety | The course is aimed at forming a systemic understanding of the principles of ensuring balance between economy, social development of society, preservation of environment, protection of life and human health. Develops skills of effective management of energy and waste in the circular economy in the development of national strategies and implementation of business processes; analysis, forecasting and minimization of technological, natural and social risks; Sustainable lifestyle and responsible attitude to one's own | 5 | | | | | | | | | | | | | | | | |

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| JSC «K. Kulazhanov KazUTB» Educational program | EP 25/01-11-2025 Edition 4 |
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8 Alignment of planned learning outcomes with assessment technologies and teaching methods within the module

| Learning Outcomes (LO) Number | Planned learning outcomes for the module | Assessment technologies (tools) | Methods of learning and teaching |
|-------------------------------|--|---|--|
| LO00k1 | Demonstrates knowledge of the history of Kazakhstan and philosophy as a special form of knowledge of the world and forms a personality with a wide outlook and culture of thinking. Demonstrates an understanding of the role of physical culture in preserving health and maintaining optimal professional performance | Educational research project, content analysis, abstract, report, creative work, essay justification, analytical review, research project, case analysis, testing, others. | Interactive lecture (problem lecture, discussion lecture, lecture-conference, lecture-consultation, lecture "Press conference", lecture "Questions-answers-discussion"), test tasks, solution of situational tasks, set of test tasks for other options. |
| LO00k2 | Demonstrates knowledge of trends in the social development of society and socio-ethical values based on social norms, traditions, customs and is guided by them in various social situations and in professional activities. | Simulator, case task, creative task, project, testing, etc. | Interactive lecture, seminar (seminar "Problem identification," seminar "Problem solution," seminar "Application of problem solution"), discussions, work in mini-groups and others. |
| LO00k3 | Able to classify software, use it for its intended purpose, restructure and interpret, if necessary, as well as manage software products developed by himself Develops the ability to interpersonal social and professional communication in the state, Russian and foreign languages | Simulator, case task, creative task, oral questioning, testing, multi-level tasks and tasks, test work, etc. | Communication-activity approach to language mastery, practical methods, interactive lecture, seminar, test tasks, solution of situational tasks, set of test tasks for other options. |
| LO1 | Forms competencies in the field of economics, law, the basics of anti-corruption culture, entrepreneurship skills and financial literacy for effective energy and waste management in making management and technical decisions. | Simulator, laboratory work on information technology, case task, creative task, testing, report, message, workbook, blitz survey, etc. | Interactive lecture, seminar (seminar "Problem identification," seminar "Problem solution," seminar "Application of problem solution"), test tasks, solution of situational tasks, set of test tasks for options and others. |
| LO2 | Applies fundamental natural science and engineering knowledge in professional activities, providing calculation, design and optimization of technical solutions | Training and research project, technical tasks and tasks, protection of laboratory work with physical, chemical or virtual equipment, report, message, workbook, blitz survey, etc. | Case task (analysis of specific situations), project method (development and transformation of own experience and competence) and others. |

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| JSC «K.Kulazhanov KazUTB» | EP 25/01-11-2025 |
| Educational program | Edition 4 |



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| LO3 | Analyzes the principle of operation, design features and technical characteristics of technological equipment for the correct selection, operation and maintenance in accordance with the requirements of the production process | Multi-level technical tasks and tasks, solving production cases, oral survey, testing, blitz survey, presentation protection, content analysis, abstract, report, etc. | Interactive lecture; visual methods (video materials, phenomena, visual aids); brainstorming, test tasks, solution of situational tasks, a set of control tasks for options, etc. |
| LO4 | Defines the relationship between equipment design and functionality in different processes to optimize operation and improve the efficiency of production systems | Technical and situational tasks, graphic work protection, drawing analysis, testing, blitz survey, presentation protection, report, etc. | Process modeling, working with graphic editors, brainstorming, test tasks, solving situational problems, a set of test tasks for options, etc. |
| LO5 | Uses software, digital tools and intelligent technologies to simulate and calculate the parameters of technological machines aimed at automating and optimizing machine-building processes. | Technical tasks, calculation and graphic work, research work with physical or virtual equipment, modeling, protection of a digital project, report, oral questioning, testing, test work, etc. | Interactive lecture; workshops using computer simulation, simulation, work in AutoCAD training through problem-making, research, brainstorming. |
| LO6 | Analyzes the causes of possible equipment malfunctions, identifying weaknesses in structures and operating modes to develop measures to improve reliability, extend service life and minimize downtime in production processes | Research Project, Analysis Report, Feasibility Study, Drawing Review, Project Protection, etc. | Analysis of production situations, engineering tasks, analysis of cases, brainstorming, test tasks, etc. |
| LO7 | Ensures the safety and quality of food products by designing technological equipment that meets environmental and metrological standards | Technical tasks and tasks, calculation and graphic work, checklist, assessment of compliance with standards, reports, etc. | Design and analytical activities, study of regulatory documentation, analysis of cases, etc. |
| LO8 | Performs commissioning of process equipment, including parameter setting and test runs, ensuring compliance with technical characteristics and safety requirements. | Technical tasks and tasks, research project, analytical review, project protection, technical report, etc. | Analysis of production situations, engineering tasks, analysis of cases, brainstorming, test tasks, solution of situational tasks, a set of test tasks for options, etc. |
| LO9 | Designs process equipment taking into account the requirements of energy efficiency, reliability, safety and quality, ensuring compliance of design solutions with production tasks, regulatory documents and technical operation requirements. | Project Work Protection, Analytical Review, Feasibility Study, Drawing Review, Expert Review, etc. | Engineering design, course and diploma design, teamwork on TR (terms of reference), modeling. |

9 Correlation of learning outcomes of the educational program with the labor functions of professional standards

| Name of the professional standards used | Professions at level 6 of the SQF | Labor functions | Tasks | Learning outcomes for the educational program |
|---|--|---|--|--|
| "Conducting tests" 07.08.2023 No. 125 | Commissioning and testing engineer | LF2. Carrying out technological operations for adjustment and testing | Task 1: Carrying out commissioning works of new technological equipment | LO8 Performs commissioning of process equipment, including parameter setting and test runs, ensuring compliance with technical characteristics and safety requirements. |
| | | | Task 2: Adjustment of technological equipment for the production of a certain group of products | |
| | Task 3: Design of test products, processing of test products and performance of work to verify the characteristics of technological equipment | | | |
| | Task 4: Performance of checks of declared characteristics of process equipment | | | |
| | Design engineer | | | |
| Requirements for personal competencies: Competence, responsibility, observation, decision-making, independence, impartiality | | | | |

10 Graduate model

| GRADUATE MODEL | | | |
|--|--|--|---|
| Professional standard «Conducting tests» | Competencies (soft skills, digital skills) | | |
| | Attributes of a graduate | Knowledge | Skills |
| | Competence, responsibility, observation, decision-making, independence, impartiality | <ol style="list-style-type: none"> 1. Knows the devices and methods of operation of the system with numerical program control; 2. Computer-aided design and control tools; 3. Technical characteristics, design features, purpose and operating modes of process equipment of medium and high complexity, rules for its technical operation; 4. Methods for modeling technological processes using standard packages and computer-aided design tools; 5. Means of quality control of the manufacture of test products; 6. Packages of modern applications for solving practical problems related to the selection of a test product; 7. Principles of operation, installation and technical operation of high complexity process equipment 8. Methods and tools for analyzing the operation of process equipment; 9. Modern methods and means of analysis of measuring equipment and process equipment. | <ol style="list-style-type: none"> 1. Able to draw up applications for technological equipment and spare parts; 2. Prepare technical documentation for medium complexity process equipment; 3. Enter the control program into the numerical control system (CNC); 4. Organize the work of small teams of performers for the adjustment of technological equipment of medium complexity; 5. Analyze production and non-production costs for ensuring the required product quality; 6. Control the quality of work, make the necessary adjustments to the methods and methods of adjustment; 7. Develop methodological and regulatory documents, technical documentation; 8. Draw up technical documentation. |
| | Professional skills (hard skills) | | |
| <ol style="list-style-type: none"> 1. Performs commissioning and adjustment of process equipment; 2. Sets up technological equipment for the manufacture of a certain group of products; 3. Designs a test product, performs processing of the test product and performs work on checking the characteristics of technological equipment; 4. Checks the declared characteristics of the process equipment. | | | |

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|--|--|---|--|-----------|------------|------------|------------|------------|----------|-----------|------------|-----------|---|-----------|---|
| 6 | Дене шынықтыру Физикалық культура Physical Culture | ЖБП (МК) FK 1106-25 (3) ООД FK 1106-25 (3) ЖБП FK 1202-25 (3) | FK 1106-25 (3) FK 1106-25 (3) FK 1106-25 (3) | 3 | 2 | 60 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 0 + 2 + 0 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option |
| 7 | Философия Philosophy | ЖБП (МК) FK 1106-25 (4) ООД FK 1106-25 (4) | FK 1106-25 (4) FK 1106-25 (4) FK 1106-25 (4) | 4 | 5 | 150 | 45 | 30 | 15 | 15 | 90 | 2 + 1 + 0 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| 8 | Дене шынықтыру Физикалық культура Physical Culture | ЖБП (МК) FK 1106-25 (4) ООД FK 1106-25 (4) | FK 1106-25 (4) FK 1106-25 (4) FK 1106-25 (4) | 4 | 2 | 60 | 30 | 30 | 30 | 30 | 30 | 0 + 2 + 0 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| Барлығы модуль бойынша / Итого по модулю / Total for module | | | | 31 | 930 | 375 | 150 | 225 | 0 | 60 | 495 | | | | |

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|--|---|---|---|-----------|------------|------------|-----------|-----------|-----------|-----------|------------|-----------|---|--|--|
| Жаратылыстану ғылымдары / Natural sciences | | | | | | | | | | | | | | | |
| 1 | Физика Физика Physics | БП (ЖК) БД (БК) ВД (УС) FK 1202-25 FK 1202-25 FK 1202-25 | FK 1202-25 FK 1202-25 FK 1202-25 | 1 | 4 | 120 | 45 | 15 | 15 | 15 | 60 | 1 + 1 + 1 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| 2 | Жоғары математика Высшая математика Higher mathematics | БП (ЖК) БД (БК) ВД (УС) VMat1201+25 VMat1201+25 VMat1201+25 | VMat1201+25 VMat1201+25 VMat1201+25 | 1 | 5 | 150 | 45 | 15 | 30 | 15 | 90 | 1 + 2 + 0 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| 3 | Жалпы химия Общая химия General chemistry | БП (ТК) БД (КВ) ОНЧ (БС) OCh 1201-25 OCh 1201-25 OCh 1201-25 | OCh 1201-25 OCh 1201-25 OCh 1201-25 | 1 | 4 | 120 | 45 | 15 | 15 | 15 | 60 | 1 + 1 + 1 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| 4 | Органикалық және бойорганикалық химия Органическая и неорганическая химия Organic and inorganic chemistry | БД (БС) ОНЧ (БС) ONCh 1201-25 ONCh 1201-25 | ONCh 1201-25 ONCh 1201-25 | 1 | 4 | 120 | 45 | 15 | 15 | 15 | 60 | 1 + 1 + 1 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| Барлығы модуль бойынша / Итого по модулю / Total for module | | | | 13 | 390 | 135 | 45 | 60 | 30 | 45 | 210 | | | | |

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|--|--|---|--|-----------|------------|------------|-----------|------------|-----------|-------------------------------|------------|-----------|---|--|--|
| Инженерлік / Инженерный / Engineering | | | | | | | | | | | | | | | |
| 1 | Инженерлік және компьютерлік графика Инженерная и компьютерная графика Engineering Computer Graphics | БП (ЖК) БД (БК) ВД (УС) IKG 2210-25 IKG 2210-25 IKG 2210-25 | IKG 2210-25 IKG 2210-25 IKG 2210-25 | 2 | 6 | 180 | 60 | 30 | 30 | 15 | 105 | 2 + 2 + 0 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| 2 | Оқу практикасы Учебная практика Educational practice | БП (ЖК) БД (БК) ВД (УС) UP 25 (Tmo) UP 25 (Tmo) UP 25 (Tmo) | UP 25 (Tmo) UP 25 (Tmo) UP 25 (Tmo) | 2 | 2 | 60 | 0 | 0 | 0 | 2 апта / неделя / weeks | | | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| 3 | Теориялық және колланбалы механика Теоретическая и прикладная механика Theoretical and applied mechanics | БП (ЖК) БД (БК) ВД (УС) TPM 2202-25 TPM 2202-25 TPM 2202-25 | TPM 2202-25 TPM 2202-25 TPM 2202-25 | 3 | 5 | 150 | 45 | 15 | 30 | 15 | 90 | 1 + 2 + 0 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| 4 | Білім алушының оқу-зерттеу жұмыстары Учебно-исследовательская работа обучающегося Educational and research work of the student | БП (ТК) БД (КВ) БД (ЕС) UIRS 2203-25 UIRS 2203-25 UIRS 2203-25 | UIRS 2203-25 UIRS 2203-25 UIRS 2203-25 | 3 | 5 | 150 | 45 | 15 | 30 | 15 | 90 | 1 + 2 + 0 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| 5 | Патенттоғалық Патентология Patentology | БП (ЖК) БД (БК) ВД (УС) Pat 2203-25 Pat 2203-25 Pat 2203-25 | Pat 2203-25 Pat 2203-25 Pat 2203-25 | 4 | 5 | 150 | 45 | 15 | 30 | 15 | 90 | 1 + 2 + 0 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| 6 | Материалдар келтіргісі Сопрогнозирование материалов Strength of materials | БП (ЖК) БД (БК) ВД (УС) SM 2205-25 SM 2205-25 SM 2205-25 | SM 2205-25 SM 2205-25 SM 2205-25 | 4 | 5 | 150 | 45 | 15 | 30 | 15 | 90 | 1 + 2 + 0 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| 7 | Робототехникалық жүйелер механикасы Механика робототехнических систем. Mechanics of robotic systems | БП (ТК) БД (КВ) БД (ЕС) MRS 2203-25 MRS 2203-25 MRS 2203-25 | MRS 2203-25 MRS 2203-25 MRS 2203-25 | 4 | 5 | 150 | 45 | 15 | 30 | 15 | 90 | 1 + 0 + 2 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| 8 | Машиналар мен механизмдер теориясы Теория механизмов и машин Theory of mechanisms and machines | БП (ТК) БД (КВ) БД (ЕС) TMM 2203-25 TMM 2203-25 TMM 2203-25 | TMM 2203-25 TMM 2203-25 TMM 2203-25 | 4 | 5 | 150 | 45 | 15 | 30 | 15 | 90 | 1 + 0 + 2 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| Барлығы модуль бойынша / Итого по модулю / Total for module | | | | 28 | 840 | 240 | 90 | 120 | 30 | 75 | 465 | | | | |

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|--|---|--|---|---|---|-----|----|----|----|----|----|-----------|---|--|--|
| Технологиялық / Технологический / Technological | | | | | | | | | | | | | | | |
| 1 | Өзара алмастыру, стандарттау және техникалық өлшемдер Взаимозаменяемость, стандартизация и технические измерения Interchangeability, standardization and technical measurements | БП (ТК) БД (КВ) БД (ЕС) VzSTI 2204-25 VzSTI 2204-25 VzSTI 2204-25 | VzSTI 2204-25 VzSTI 2204-25 VzSTI 2204-25 | 3 | 5 | 150 | 45 | 15 | 30 | 15 | 90 | 1 + 2 + 0 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| 2 | Машина жасаудағы стандарттау және сертификаттау Стандартизация и сертификация в машиностроении Standardization and certification in mechanical engineering | БП (ТК) БД (КВ) БД (ЕС) SSM 2204-25 SSM 2204-25 SSM 2204-25 | SSM 2204-25 SSM 2204-25 SSM 2204-25 | 3 | 5 | 150 | 45 | 15 | 30 | 15 | 90 | 1 + 2 + 0 | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |
| 3 | Материалтану Материаловедение Materials Science | БП (ТК) Mat 2205-25 Mat 2205-25 Mat 2205-25 | Mat 2205-25 Mat 2205-25 Mat 2205-25 | | | | | | | | | | Білім алушының тапсыру бойынша/ По выбору обучающегося/ By student's option | | |

| Бардыгы модуль бойынша / Итого по модулю / Total for module | | Өндүрүштүк / Производственный / Production | | | | | | | | | | Бардыгы / Итого | | Бардыгы / Итого | | Бардыгы / Итого | | Бардыгы / Итого | | Бардыгы / Итого | | Бардыгы / Итого | | | | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|--|--|-----------------|--|-----------------|--|-----------------|--|-----------------|--|-----------------|--|-----------------|--|-----|--|-----|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | 35 | | 1050 | | 315 | | 105 | | 210 | | 0 | | 105 | | 630 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
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| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
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| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
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| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
| | | | | | | | | | | | | 8 | | 150 | | 45 | | 15 | | 30 | | 0 | | 15 | | 90 | | | | | | | | | |
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ЭКСПЕРТНОЕ ЗАКЛЮЧЕНИЕ

На образовательную программу 6B07119 – Технологические машины и оборудование (по отраслям)

По направлению подготовки B064 Механика и металлообработка

Наименование организации образования/предприятия – партнера по разработке образовательной программы АО «Казахский университет технологии и бизнеса имени К. Кулажанова»

Общая характеристика образовательной программы Образовательная программа 6B07119 – «Технологические машины и оборудование (по отраслям)» разработана в соответствии с требованиями Государственного общеобязательного стандарта высшего и послевузовского образования, утвержденный приказом Министра науки и высшего образования Республики Казахстан от 20 июля 2022 года №2 и внутреннему документу АО «Казахский университет технологии и бизнеса имени К. Кулажанова» «Положение о разработке образовательных программ», №5 протокол, от 28.12. 2022 г».

Образовательная программа 6B07119 – «Технологические машины и оборудование (по отраслям)» соответствует нормативным правовым актам, регламентирующим профессиональную деятельность НРК, ОРК и трудовым функциям.

Образовательная программа 6B07119 – «Технологические машины и оборудование (по отраслям)» соответствует современному уровню развития пищевой и перерабатывающей отраслей, сфер жизнедеятельности общества, уровню и достижениям современной науки, техники, а также запросам и потребностям работодателей в области пищевых и перерабатывающих производств. Применяет теоретические и практические знания по контрольно-измерительному оборудованию, использует нормативные документы по проведению поверки и калибровки средств измерений. Формирует знания о целях и задачах продовольственной безопасности и качества, методах фальсификации и ее идентификации, экспертизе идентификации товара, методах анализа подлинности товара, данных о качестве продукции.

Описание и оценка структуры образовательной программы

Программа обеспечивает высокое качество подготовки бакалавра техники и технологии, способного решать инженерные задачи в различных секторах отрасли. Программа демонстрирует высокую степень практико-ориентированности и гибкости. Обучающиеся осваивают основные показатели качества изделия, надежность и технико-экономическую эффективность работы системы автоматического управления с использованием вычислительной техники и направлена на формирование навыков самостоятельного моделирования технологического процесса производства, построения схемы производства пищевой продукции,

По структуре образовательная программа построена по модульному принципу на основе компетентностного подхода. Положительным моментом является то, что обучающим предоставлена возможность выбора различных образовательных траекторий обучения и направлена на формирование умения владеть и применять методы получения, преобразования, передачи и использования тепла, а также принцип действия и конструктивные особенности тепловых машин, агрегатов и устройств тепловых и парогенераторов.

Общее заключение:

Обучающимся по данной ОП полезно изучить следующие дисциплины: «Учебно-исследовательская работа обучающегося», «Механика робототехнических систем», «Техническая диагностика технологического оборудования», «Энергосберегающие технологии в пищевой промышленности», «Расчет и конструирование машин и аппаратов

пищевых производств», поэтому рекомендуем включить их в каталог элективных дисциплин. Привлекать представителей работодателей к формированию и оценке профессиональных компетенций, а также к проведению практических занятий, мастер-классов и итоговой аттестации. Приобретать навыки участия в процессах проверки качества и оптимизации контроля повышения качества готовой продукции способен внедрять систему менеджмента качества в производство, контроль и соблюдение нормативных требований на всех этапах производства.

Рекомендации по использованию или усовершенствованию образовательной программы

По окончании курса студенты получают навыки и знания, необходимые для успешного управления объектами с применением современных технологий искусственного интеллекта.

В освоении методов и средств автоматизации, используемых для управления технологическими процессами и производственными операциями, навыки рационального использования холодильных технологий для обеспечения качества и безопасности пищевых продуктов, ОП 6B07119 – «Технологические машины и оборудование (по отраслям)» рекомендуется в учебном процессе при подготовке бакалавра техники и технологий образовательной программы 6B07119 – «Технологические машины и оборудование (по отраслям)».

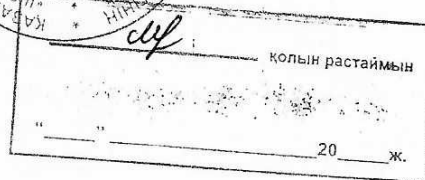
Рецензент:

**к.т.н., ассоциированный профессор,
зав. кафедрой «Технологическое оборудование»
НАО «Шәкәрім университет»,
(г. Семей, Республика Казахстан)**

16.05. 2025 г.



Абдилова Г.Б.



ЭКСПЕРТНОЕ ЗАКЛЮЧЕНИЕ

На образовательную программу «6В07119 – Технологические машины и оборудование (по отраслям)»

По направлению подготовки В064 Механика и металлообработка

Наименование организации образования/предприятия – партнера по разработке образовательной программы АО «Казахский университет технологии и бизнеса имени К. Кулажанова»

Общая характеристика образовательной программы

Образовательная программа 6В07119 – «Технологические машины и оборудование (по отраслям)» разработана в соответствии с требованиями Государственного общеобязательного стандарта высшего и послевузовского образования, утвержденный приказом Министра науки и высшего образования Республики Казахстан от 20 июля 2022 года №2 и внутреннему документу АО «Казахский университет технологии и бизнеса имени К. Кулажанова» «Положение о разработке образовательных программ», №5 протокол, от 28.12.2022 г».

Образовательная программа 6В07119 – «Технологические машины и оборудование (по отраслям)» соответствует нормативным правовым актам, регламентирующим профессиональную деятельность НРК, ОРК и трудовым функциям.

Образовательная программа 6В07119 – «Технологические машины и оборудование (по отраслям)» соответствует современному уровню развития пищевой и перерабатывающей отраслей, сфер жизнедеятельности общества, уровню и достижениям современной науки, техники, а также запросам и потребностям работодателей в области пищевых и перерабатывающих производств. Программа ориентирована на подготовку специалистов, способных работать в условиях современных пищевых и перерабатывающих производств, учитывая достижения науки, техники и инноваций. В ней отражены актуальные требования рынка труда и запросы работодателей.

Описание и оценка структуры образовательной программы

Разработчики образовательной программы по направлению 6В07119 – «Технологические машины и оборудование (по отраслям)» применили компетентностный подход, что выразилось в создании матрицы распределения компетенций выпускника на весь период обучения. Такой системный метод позволяет четко отслеживать формирование ключевых компетенций обучающихся на каждом этапе, по завершении учебных дисциплин и модулей, что обеспечивает поэтапное развитие профессиональных навыков и знаний.

Программа включает детально проработанный учебный план бакалавриата с учётом профильной специализации, рабочие программы дисциплин, планы практик и требования к итоговой аттестации, включая выпускную квалификационную работу. Вся структура программы отличается логичной последовательностью, целостностью и тесной взаимосвязью всех компонентов, что способствует комплексному освоению учебного материала и формированию необходимых профессиональных компетенций.

Особое внимание уделяется внедрению в учебный процесс таких дисциплин, как «Учебно-исследовательская работа обучающегося», «Механика робототехнических систем», «Техническая диагностика технологического оборудования», «Энергосберегающие технологии в пищевой промышленности» и «Расчет и конструирование машин и аппаратов пищевых производств». Рекомендуется включить эти курсы в каталог элективных дисциплин, поскольку их освоение позволит значительно расширить профессиональные горизонты студентов и повысить их подготовленность к современным вызовам индустрии.

Общее заключение

Овладение профессиональными знаниями и практическими навыками является ключевой основой высокой конкурентоспособности выпускников на современном рынке труда. Это обеспечивает им уверенную возможность успешного трудоустройства по специальности и получение востребованной профессии в отрасли. Кроме того, сформированные компетенции способствуют адаптации к быстро меняющимся технологическим и производственным условиям, позволяют выпускникам эффективно решать профессиональные задачи, внедрять инновационные технологии и занимать ответственные позиции в инженерных, научных и управленческих сферах. Таким образом, программа формирует специалиста, способного внести значимый вклад в развитие пищевой и перерабатывающей промышленности, отвечая требованиям работодателей и общества в целом.

Рекомендации по использованию или усовершенствованию образовательной программы: Образовательная программа 6В07119 – «Технологические машины и оборудование (по отраслям)» рекомендуется к применению в учебном процессе при подготовке бакалавров техники и технологий. Программа соответствует современным требованиям отрасли, обеспечивает комплексное формирование профессиональных, исследовательских и управленческих компетенций. Для повышения эффективности подготовки рекомендуется регулярно обновлять содержание дисциплин с учетом актуальных научно-технических достижений и потребностей рынка труда, расширять каталог элективных курсов с включением современных технологий автоматизации, цифровизации и энергоэффективности. Важно также усилить практическую составляющую программы за счет сотрудничества с промышленными предприятиями, внедрения проектной и исследовательской деятельности, а также развития навыков работы с современным оборудованием и программным обеспечением. Такой подход позволит выпускникам успешно адаптироваться к требованиям профессиональной среды и повысит их конкурентоспособность на рынке труда.

Рецензент:

Директор
ТОО «Барыс «РА»



Хайрлиева С.Т.

ЭКСПЕРТНОЕ ЗАКЛЮЧЕНИЕ

На образовательную программу «6В07119 – Технологические машины и оборудование (по отраслям)»

По направлению подготовки В064 Механика и металлообработка

Наименование организации образования/предприятия – партнера по разработке образовательной программы АО «Казахский университет технологии и бизнеса имени К. Кулажанова»

Общая характеристика образовательной программы Образовательная программа 6В07119 – «Технологические машины и оборудование (по отраслям)» разработана в соответствии с требованиями Государственного общеобязательного стандарта высшего и послевузовского образования, утвержденный приказом Министра науки и высшего образования Республики Казахстан от 20 июля 2022 года №2 и внутреннему документу АО «Казахский университет технологии и бизнеса имени К. Кулажанова» «Положение о разработке образовательных программ», №5 протокол, от 28.12.2022 г».

Образовательная программа 6В07119 – «Технологические машины и оборудование (по отраслям)» соответствует нормативным правовым актам, регламентирующим профессиональную деятельность НРК, ОРК и трудовым функциям.

Образовательная программа 6В07119 – «Технологические машины и оборудование (по отраслям)» отвечает запросам работодателей, предусматривает развитие ключевых инженерных и цифровых компетенций, а также адаптирована для обучения лиц с особыми образовательными потребностями.

Описание и оценка структуры образовательной программы

Образовательные модули формируют у студентов как общие (коммуникативные, управленческие), так и профессиональные компетенции, соответствующие компетентности модели выпускника. Программа предусматривает несколько этапов профессиональной практики, включая производственную и преддипломную практику, которые проходят на профильных предприятиях и соответствуют видам будущей профессиональной деятельности. А также подготовку высококвалифицированных, конкурентоспособных бакалавров в области автоматизации и механизации технологических процессов для предприятий общественного питания, пищевой и перерабатывающей промышленности в сфере технического обслуживания, эксплуатации, ремонта оборудования, агрегатов, машин и аппаратов, а также владеющих навыками проектирования и освоения современной техники и технологий.

Общее заключение:

Исследование пищевого и перерабатывающего оборудования различного технологического назначения с целью оценки его надежности и работоспособности, обеспечение бесперебойной работы машин и аппаратов, расчет их основных характеристик и эксплуатационных параметров в связи с проектированием нового или реконструкцией действующего оборудования. Требуется **внедрить элементы дуального обучения**, усилив практико-ориентированную направленность программы путем тесной интеграции учебного процесса с производственной деятельностью предприятий-партнеров.

Обучающимся по данной ОП полезно изучить следующие дисциплины: «Учебно-исследовательская работа обучающегося», «Механика робототехнических систем», «Техническая диагностика технологического оборудования», «Энергосберегающие

