SATBAYEV UNIVERSITY	NON-PROFIT JOINT STOCK COMPANY «KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K.I.SATBAYEV»
	COMPETENCY MODEL OF A GRADUATE Type of regulatory document

COMPETENCY MODEL OF A GRADUATE

of the Kazakh National Research Technical University named after K.I. Satpayev

for Educational Program
6B07134 - «Mechatronics and automation in mechanical engineering»

Almaty 2025

Non-profit Joint Stock Company "KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K.I. SATPAYEV"

APPROVING:
Director of the Burkitbaev Institute of Energy and Mechanical Engineering
_____ K.K.Yelemessov
"_25_" __10__ 2025 y.

COMPETENCY MODEL OF A GRADUATE

6B07134 - «Mechatronics and automation in mechanical engineering»

1 Purpose of the educational program

Formation of highly qualified specialists capable of developing and implementing automated control systems in mechanical engineering based on modern mechatronic technologies, contributing to technological innovation, sustainable industrial development and environmentally responsible production.

2 Objectives of the educational program

- Formation of students ' fundamental and applied knowledge in the field of mechatronics and automation, development of critical thinking, digital and professional competencies necessary for successful work in the context of rapidly changing technologies (SDG 4);
- PDevelop practical skills in the design, implementation and operation of mechatronic systems and equipment, and participate in researchaimed at the sustainable development of mechanical engineering (SDG 9);
- Training in the principles of rational use of resources, designing energy-efficient systems and applying environmentally friendly technologies in production (SDG 12).
- Creating conditions for continuous professional growth and inclusive education (SDG 4).
- preparation for working in an interdisciplinary team and in a digital production environment (Industry 4.0).
- Promoting the integration of graduates into the professional community (SDGs 9, 12).

3 Subjects of professional activity

Mechatronic and robotic systems; automated technological equipment and production lines; sensor-actuating modules; numerical control systems (CNC); controllers and automatic control systems; technologies of digital design and modeling of automated technological systems; software and hardware automation of production processes; technologies of implementation of elements of the industrial Internet of things (IIoT) in machine-building production.

4 Decomposition of key tasks of the specialty into clusters of "related" competencies.

Areas of professional activity:

- Design and construction: development of mechatronic components, automated and robotic systems, control systems and actuators.
- Integration and implementation: installation, commissioning and integration of automated equipment, robotic complexes and CNC systems into production processes.
- Programming and configuration: writing and debugging control programs for CNC machines, industrial robots and other components of automated systems.
- Diagnostics and maintenance: maintenance, condition monitoring, fault diagnosis and repair of mechatronic and automated equipment.

- Optimization and modernization: improvement of production processes through the introduction of digital technologies, reengineering and adaptation of intelligent control systems.
- Research activities: conducting applied research in the field of mechatronics, automation, sensors and digital technologies; participating in the development of innovative solutions.
- Organizational and managerial activities: organization of work of production units, project management for automation and digitalization of production.

5 Requirements for the key competencies of the bachelor of the educational program 6B07134 - «Mechatronics and automation in mechanical engineering»

The educational program is aimed at deep theoretical and practical training of bachelors in the field of mechanical engineering. Training of a graduate capable of solving professional tasks of production, technological, service, operational and organizational and managerial activities.

Learning outcomes are expressed through competencies and designed based on Dublin Level 1 Descriptors (Undergraduate). Layer 1 descriptors assume abilities:

- demonstrate knowledge and understanding in the field under study, including elements of the most advanced knowledge in this field;
- apply this knowledge and understanding at a professional level;
- formulate arguments and solve problems in the area under study;
- collect and interpret information for generation

judgments taking into account social, ethical and scientific considerations;

- communicate information, ideas, problems and solutions to both specialists and non-specialists.

When determining competencies, training results formed in the PD, and in the future, to form the content of training, the following were used as initial data:

- requirements of the State compulsory standard of higher and postgraduate education approved by the Decree of the Government of the Republic of Kazakhstan dated August 23, 2012 No. 1080;
- needs of regional, republican, national and international labour markets;
- survey of all stakeholders to determine competencies.

General competencies of higher education are formed on the basis of requirements for general education, socio-ethical competencies, economic and organizational and managerial competencies, special competencies.

6 Модель компетентности специалиста по результатам завершения образовательной программы

General Competencies of Bachelor OP 6B07134 - Mechatronics and automation in mechanical engineering	Форма проявления компетенции
General education requirements	Possession of basic knowledge in the field of natural sciences (social, humanitarian, economic) disciplines that contribute to the formation of a highly educated personality with a broad outlook and culture of thinking; possessing skills in handling modern technology, the ability to use information technologies in the field of professional activities; proficiency in acquiring new knowledge necessary for daily professional activities. The

	ability to navigate the world around us, analyze modern processes, aware of them in the context of historical time, respectfully and carefully treat historical heritage and cultural traditions. The ability to use, summarize and analyze information, set goals and find ways to achieve them in the context of the formation and development of the information society. Willingness to use basic methods, methods and means of obtaining, storing, processing information, willingness to work with a computer as a means of managing information; use modern software tools for the execution and editing of images and drawings, the ability to work with design and technological documentation; willingness to work with information in global computer networks. The ability to use basic knowledge of mathematics and physics in cognitive and professional activities.
Requirements for socio-ethical competencies	Knowledge of social and ethical values based on public opinion, traditions, customs, social norms and orientation to them in their professional activities; compliance with business ethics, knowledge of ethical and legal standards of conduct; knowledge of the traditions and culture of the peoples of Kazakhstan; be tolerant of traditions, culture of other peoples of the world; knowledge of the fundamentals of the legal system and legislation of the Republic of Kazakhstan; ability to adequately navigate various social situations; be able to work in a team, correctly defend their point of view, propose new solutions, find compromises, correlate their opinion with the opinion of the team; striving for professional and personal growth. Master the skills of scientific research of political processes and relations, methods of analysis and interpretation of ideas about politics, state and power. Ability and readiness for social interaction with society, community, team, family, friends, partners; cooperation and conflict resolution; to tolerance, respect and acceptance of the other. Ability to use regulatory documents of the Republic of Kazakhstan in professional activities, legal moral and ethical standards. Ability and willingness to work in an international environment, accepting differences and multiculturalism. The ability to understand the place and role of ecology in solving modern economic and political problems. The ability to understand the social significance of physical culture and sports, their role in everyday life, in personal development and preparation for professional activities. Strive for professional and personal growth.
Requirements for economic, organizational managerial competencies	Knowledge and understanding of the goals and methods of government regulation of the economy, the role of the public sector in the economy. Ability to understand the principles, laws and models of economic theory for industry analysis. Ability to analyze the economic characteristics of the

	infrastructure of the radio, electronics and telecommunications industries; ability to find a compromise between different requirements (cost, quality, safety and deadlines) both in long-term and short-term planning and determination of optimal solutions. Know and understand the goals and methods of state regulation of the economy, the role of the public sector in the economy. Ability to analyze natural, man-made and social phenomena and events, identify the causes of their occurrence and possible consequences, design models of personal safe behavior. The ability to participate in the development of a strategy for the management of human resources of organizations, plan and implement activities aimed at its implementation in the annex to the Belarusian Railways and Emergencies.
Requirements for special competencies	Ability to choose modern operating environments and information and communication technologies for informatization and automation of solution of applied tasks; perform computer simulation of devices, processes using universal packages of applied computer programs. The ability to use knowledge of basic physical theories to solve emerging fundamental and practical problems, to understand the principles of operation of devices, including those that go beyond the competence of a particular direction. Willingness to take into account modern trends in the development of electronics, measuring and computer technology, information technology in their professional activities.
Requirements for the readiness to change social, economic, professional roles, geographical and social mobility in the context of growing dynamism of changes and uncertainties:	Ability to navigate modem information flows and adapt to dynamically changing phenomena and processes in the global economy; knowledge of economic and organizational decision-making skills in an environment of uncertainty and risk. Ability for foreign-language professional intercultural communication, providing the ability to generate, interpret and operate on information in a foreign language; knowledge and ability to competently use professional vocabulary in their activities. Be flexible and mobile in various conditions and situations related to professional activities. Have economic and organizational decision-making skills amid uncertainty and risk.

Head of the Department of Mechanical Engineering _____ **Nugman E.Z.**

Discussed at the meeting of the Department of Mechanical Engineering
Protocol No. 3 dated October 10, 2025.