NON-PROFIT JOINT STOCK COMPANY «KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K.I.SATBAYEV»

Institute of «Energy and Mechanical Engineering named after A. Burkitbayev»

Department of «Standardization, Certification and Metrology»

EDUCATIONAL PROGRAM

6B07502 «Standardization, certification and Metrology (by industry)»

Code and classification of the field of education: 6B07 «Engineering, Manufacturing and Civil Engineering»
Code and classification of training directions: 6B075 «Standardization, certification and Metrology (by industry)»
Group of educational programs: B076 «Standardization, certification and Metrology (by industry)»
Level based on NQF: 6
Level based on IQF: 6
Study period: 4
Number of credits: 240

Almaty 2025

Educational program was approved at the meeting of K.I. Satbayev KazNRTU Academic Council

Protocol # 10 dated « 06 » 03 2025.

was reviewed and recommended for approval at the meeting of K.I. Satbayev KazNRTU Educational and Methodological Council

Protocol # 3 dated « 20 » 12 2024 .

Educational program was developed by Academic committee based on direction «6B075 Standardization, certification and metrology (by industry)»

Full name	Academic degree/ Academic title	Position	Workplace	Signature
Chairperson of Academic Committee:				
Aymagambetova Raushan	Master's degree	Head of the Department of Strategic Development and Sciences, «KazStandard»	Republican State Enterprise "KazStandard"	
Teaching staff:				
Yerezhep Darkhan	Candidate of technical sciences, PhD	Head of Department of Standardization, certification and metrology department	NJSC "KazNRTU after K.I. Satpayev",	
Karazhanova Dariga	Candidate of Pedagogical Sciences	Associate professor of Standardization, certification and metrology department	KazNRTU named after K.I.Satpayev	
Students				
Baibol Aidyn		2nd year master's student	KazNRTU	

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List of abbreviations and designations

EP – Educational program;

EO – Education outcome;

NQF – National Qualifications Framework;

SQF – Sectoral Qualifications Framework;

ISO – International Organization for Standardization;
EAEU – Eurasian Economic Union;

WTO – World Trade Organization;

OT – Labor protection

SDG – Sustainable Development Goals

1 Description of educational program

This educational program is developed on the basis of the State Compulsory Standard of Higher Education, approved by the Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2, complies with the National Qualifications Framework and professional standards, as well as the Dublin descriptors and the European Qualifications Framework, taking into account the needs of the regional labor market .

2 Purpose and objectives of educational program

Purpose of EP: Training of competitive and inclusively oriented professionals in the field of technical regulation, standardization, certification, and metrology, possessing advanced professional competencies to ensure quality, safety, and sustainable industrial development, with an emphasis on creating equal opportunities for all, including people with disabilities, thereby contributing to the implementation of innovations, infrastructure development, and optimization of production processes.

Tasks of EP: The main task is to ensure a high level of bachelor's training in accordance with the existing and forecasted needs of the sectors of the economy.
The EP is aimed at solving the following tasks:

- presentation of the characteristics of the professional activity of the graduate of the educational program;
- development and improvement of documents regulating the content and organization of the educational process in the implementation of the educational program;
- presentation of the resource support of the educational program;
- creation of conditions for self-realization of the teaching staff and students;
- development of evaluation tools for conducting an intermediate assessment of students' knowledge;
- implementation of effective solutions, various types of research projects.
- development of standards and regulatory documents aimed at optimizing production processes while considering the principles of inclusivity, which serves as an important tool for increasing efficiency, ensuring sustainable industrial development, and creating accessible infrastructure.

3 Requirements for evaluating the educational program learning outcomes

Assessment of learning outcomes is a procedure for determining the compliance of individual educational achievements of students and graduates of professional education with the requirements of consumers of educational services. Such an assessment, according to the credit technology of education, can be carried out in four stages: - assessment in the classroom (current and midterm control); - examinations in disciplines that provide individual subject and instrumental professional competencies; - final state attestation (defence of a thesis (project)),

showing the level of competence in solving a specific scientific problem (task); - certification of graduates by Employers' Associations, which allows assessing the competence of a specialist in a particular professional field. An exam as a form of control should contribute to an accurate assessment of learning outcomes, therefore, examination questions in disciplines within the competence model of a graduate must meet the following requirements: - compliance with the goals, objectives and thematic content of the course; - compliance with the declared competencies; - the possibility of an accurate, specific assessment of learning outcomes.

4 Passport of educational program

4.1. General information

№	Field name	Comments
1	Code and classification of the field of education	6B07 – Engineering, Manufacturing and Civil Engineering
2	Code and classification of training directions	6B075 – Standardization, certification and Metrology (by industry)
3	Educational program group	B076 – Standardization, certification and Metrology (by industry)
4	Educational program name	6B07502–Standardization, certification and Metrology (by industry)
5	Short description of educational program	The EP is aimed at training qualified specialists proficient in the development and analysis of the impact of standardization, metrology, and certification on accelerating scientific and technological progress, enhancing the safety and competitiveness of products and services, and improving quality management systems for products, processes, and services.
6	Purpose of EP	Training of competitive and inclusively oriented professionals in the field of technical regulation, standardization, certification, and metrology, possessing advanced professional competencies to ensure quality, safety, and sustainable industrial development, with an emphasis on creating equal opportunities for all, including people with disabilities, thereby contributing to the implementation of innovations, infrastructure development, and optimization of production processes.
7	Type of EP	New EP
8	The level based on NQF	6
9	The level based on IQF	6
10	Distinctive features of EP	no

11	List of competencies of educational program	C1. The ability of the individual to socio-cultural and physical development based on the principles of multiculturalism, multilingualism and environmental thinking C2. Willingness to apply digital technologies for the development of production, business, science, social sphere C3. Ability to understand and apply in practice knowledge in the field of social sciences, humanities and natural sciences C4. Ability to master the theory and practice of work in the field of technical regulation, standardization and metrology C5. Ability to perform organizational and managerial activities within the framework of the enterprise strategy C6. Ability to solve professional problems in the fieldof standardization, conformity assessment and metrology, striving for continuous improvement of professionalism
12	Education outcomes of educational program	EO1. Apply a system of knowledge about the surrounding world, human life.
		EO2. Using systematized knowledge, skills and abilities to solve applied problems for the development of professional competencies.
		EO3. Use communication skills in professional and interpersonal relationships.
		EO4. To use the acquired knowledge in the application of methods of state control and supervision of compliance with requirements in the field of technical regulation.
		EO5. Apply methods of control and analysis of product safety and quality, methods of production and testing of products.
		EO6. Possessing the necessary level of professional knowledge, skills, and qualifications when working with equipment, measuring instruments, reference standards of units, as well as conducting tests and calibrations, is a crucial condition for ensuring accuracy, reliability, and reproducibility of results. This contributes to the development of scientific and technological potential, the implementation of innovative solutions, and the achievement of sustainable development goals, including ensuring inclusive access to knowledge and technologies for all, regardless of physical abilities or social status (SDG 4).
		EO7. Apply skills in identifying tasks that need to be completed to achieve a specific result.
		EO8. Apply digital technologies in various areas of life.

		EO9. Use skills and abilities in the development and analysis of regulatory and technical documents, standards, testing methods, products, and measuring instruments for responsible consumption and innovative industry.
		EO10. Use methods of mathematical processing of obtained data, test results, and measurements, as well as assess the state of measurements.
		EO11. Master the basics of philosophical, legal and critical thinking with application in life.
		EO12. Develop and implement a quality management system in production and organizations.
13	Education form	Full-time
14	Period of training	4
15	Amount of credits	240
16	Languages of instruction	Kazakh, Russian, English
17	Academic degree awarded	Bachelor
18	Developer(s) and authors	Aymagambetova R. head of department, “Kazstandard”;
		Yerezhep D., head of the department SS&M
		Karazhanova D. Assoc. prof. of the department SS&M
		Baibol A., master’s student, 2 year

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

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
Cycle of general education disciplines															
1.	English language	English is a compulsary subject. According to the results of placement test or IELTS score, students are placed intogroups and disciplines. The name of the discipline corresponds to the level of English. When passing from level to level, prerequisites and postrequisites are respected.	10	v			v								
2.	Kazakh (Russian) language	Kazakh (Russian) language In this course author considers socio-political, socio- cultural spheres of communication and functional styles of the modern kazakh (russian) language. The course covers the specifics of the scientific style to develop and activate professional communication skills and abilities of students. Also, it allows students to leavn the basics of scientific style practically and develop the ability ofproduction structural and semantic text analysis.	10			v	v								
3.	Physical culture	The purpose of the discipline is to master the forms and methods of forming a healthy lifestyle within the framework of the professional education system. Familiarization with the natural-scientific basics of physical education, knowledge of modern health- improving technologies, basic methods of independent physical education and sports. As part of the course, the student will master the rules of judging in all sports.	8	v	v										
4.	Information and communication technology	The aim of the course is to gain theoretical knowledge ininformation processing, the latest information technologies, local and global	5		v							v			

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
		networks, the methods of information protection; Getting the right use of text editor editors and tabulators; creation of base and different categories of applications.													
5.	History of Kazakhstan	The purpose of the discipline is to provide objective historical knowledge about the main stages of the history of Kazakhstan from ancient times to the present day; introduce students to the problems of the formation and development of statehood and historical and culturalprocesses; contribute to the formation of humanistic values and patriotic feelings in the student; teach the student to use the acquired historical knowledge in educational, professional and everyday life; evaluate the role of Kazakhstan in world history.	5				v						v		
6.	Philosophy	The purpose of the discipline is to teach students the theoretical foundations of philosophy as a way of knowing and spiritually mastering the world; developingtheir interest in fundamental knowledge, stimulating the need for philosophical assessments of historical events and facts of reality, assimilating the idea of the unity of the world historical and cultural process while recognizing the diversity of their skills in applying philosophical and general scientific methods inprofessional activities.	5		v					v					
7.	Module of socio-political knowledge (sociology, political science)	The objectives of the disciplines are to provide students with explanations on the sociological analysis of society, about social communities and personality, factors and patterns of social development, forms of interaction, types and directions of social processes, forms of regulation of social behavior, as well as primary political knowledge that will serve as a theoretical basis for understanding social - political processes, for the formation of political culture, development of a personalposition and a clearer understanding of the extent of one's	3					v							v

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
		responsibility; help to master the political, legal, moral, ethical and socio-cultural norms necessary to act in the interests of society, form personal responsibility and achieve personal success.													
8.	Module of socio-political knowledge (cultural studies, psychology)	The purpose of the disciplines is to study the real processes of cultural creative activity of people whocreate material and spiritual values, identify the main trends and patterns of cultural development, changes in cultural eras, methods and styles, their role in the formation of man and the development of society, as well as master psychological knowledge for the effective organization of interpersonal interaction, socialadaptation in the field of their professional activities.	5					v							v
Cycle of general education disciplines Component of choice															
9.	Fundamentals of anti-corruption culture and law	Purpose: to increase the public and individual legal awareness and legal culture of students, as well as the formation of a knowledge system and a civic position oncombating corruption as an antisocial phenomenon. Contents: improvement of socio-economic relations of the Kazakh society, psychological features of corrupt behavior, formation of an anti-corruption culture, legal responsibility for acts of corruption in various fields.	5	v	v										

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№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
10.	Fundamentals of scientific research methods	Purpose: to form a systematic understanding of the methodology of scientific cognition among students; to develop scientific thinking skills; to form experience in organizing and conducting scientific research; to develop a competence-based approach to the use of methods andrules for conducting research in the field of mechanical engineering, related processes and their technologies.Contents: stages of scientific research, terms and concepts, methods of conducting an experiment, mathematical methods of processing research results. Concepts of engineering, laboratory and industrial experiment, bench research.	5					v							
11.	Basics of Financial Literacy	Purpose: formation of financial literacy of students on the basis of building a direct link between the acquired knowledge and their practical application. Contents: using in practice all kinds of tools in the field of financial management, saving and increasing savings, competent budget planning, obtaining practical skills in calculating,paying taxes and correctly filling out tax reports, analyzing financial information, orienting in financial products to choose adequate investment strategies.	5	v	v					v					
12.	Fundamentals of economics and entrepreneurship	Purpose: To develop basic knowledge of economicprocesses and skills in entrepreneurial activities. Content: The course aims to develop skills in analyzing economic concepts such as supply and demand, and market equilibrium. It includes the basics of creating and managing a business, developing business plans, risk assessment, and strategic decision-making.	5		v					v					

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
13.	Ecology and life safety	Purpose: formation of ecological knowledge and consciousness, obtaining theoretical and practical knowledge on modern methods of rational use of natural resources and environmental protection. Contents: the study of the tasks of ecology as a science, the laws of the functioning of natural systems and aspects of environmental safety in working conditions, environmental monitoring and management in the field of its safety, ways to solve environmental problems; life safety in the technosphere, emergencies of a natural and man-made nature.	5				v								
Cycle of basic disciplines University component															
14.	WTO activities and exportpromotion	The purpose of the discipline is to acquire theoretical and practical knowledge in the field of internationalstandardization, WTO activities. The main WTO agreements on technical barriers to trade, sanitary and phytosanitary measures are considered. As a result, students acquire practical skills to streamline and simplify trade processes	6									v			
15.	Legislative metrology	Purpose: Study of the basic laws governing legal relations in the field of metrology. Contents: Consideration of general rules, requirements and norms subject to regulation and control by the state, as well as state administration and regulation of metrological activities in the Republic of Kazakhstan.	5										v		
16.	Engineering and computer graphics	Purpose: To develop students' knowledge of drawing construction and skills in developing graphical and textual design documentation in accordance with standards. Content: Students will study ESKD standards, graphic primitives, geometric constructions, methods and properties of orthogonal projection, Monge's projection, axonometric projections,	5						v						

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
		metric tasks, types and features of connections, creating part sketches and assembly drawings, detailing, and creating complex 3Dsolid objects in AutoCAD.													
17.	Qualimetry	The purpose of studying the discipline is to form students' scientific ideas about the nature and properties of probabilistic processes, random variables, distribution functions and statistical methods, mastering practicalskills of working with random variables and methods of their search and evaluation. The subject of probability theory, probability definitions, elements of combinatorics, random variables and the laws of their distribution are considered. The basics of mathematical statistics are studied – samples, types of samples, point and interval estimates.	5			v					v		v		
18.	Mathematics	The purpose of mastering the discipline is to form the theoretical and practical foundations of mathematics andits applications. On the basis of studying the mathematics section, to give students the development of thinking and the achievement of mathematical culture, which is necessary for application in future professional activities. The course is based on the study of mathematical analysisin a volume that allows you to study elementary functions and solve the simplest geometric, physical and other applied problems. The main focus is on differential and integral calculus. The course sections include the differential calculus of functions of one variable, the derivative and differentials, the study of the behavior of functions, complex numbers, and polynomials. Indefinite integrals,	5										v		v

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
		their properties and methods of calculation. Certain integrals and their applications. Improper integrals.													
19.	Metrology	Purpose: Acquiring knowledge to ensure the uniformity of measurements and measurement theory. Content: Theoretical, legislative and applied metrology; methods for ensuring accuracy; accuracy classes; testing, control and verification of measuring instruments; organization of metrological activities; legislative and regulatory acts; structure and functions of the metrological service.	5										v		v
20.	Descriptive geometry	Purpose: Studying the theoretical foundations of constructing technical drawings and developing spatial thinking. Content: Formation of knowledge and skills necessary for performing and reading drawings of all industries and construction, including metrological equipment.	5						v						v
21.	General theory of measurements	Purpose: Study of the general laws and rules of measurements, requirements for accuracy, correctness and reliability of measurement results. Content: Consideration of terms and definitions, basic physical quantities, laws of distribution of random variables, types and measurement errors.	6				v		v			v			
22.	General Chemistry	The purpose of the discipline is to study the basic concepts and laws of chemistry; fundamental laws of chemical thermodynamics and kinetics; quantum mechanical theory of atomic structure and chemical bond. Solutions and their types, redox processes, coordination compounds: formation, stability and properties. The structure of matter and the chemistry of the elements.	4								v	v			

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№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
23.	Bases of interchangeability	Purpose: Studying the concepts of interchangeability, types of tolerances, characteristics and calculations, as well as accuracy classes. Content: Consideration of the interchangeability of smooth cylindrical mates, tolerances and fits of rolling bearings, threaded connections, designations on drawings and issues of deviation of shapes and arrangement of surfaces.	5									v	v		
24.	Fundamentals of standardization and metrology	Purpose: Study of the essence, subject and goals of standardization and metrology. Content: Consideration of physical and non-physical quantities, basic, additional and derived units, standards, measuring instruments, measurement techniques and liability for violation of metrological rules.	5			v						v			
25.	Occupational health and industrial safety (by industry)	Purpose: formation of knowledge, skills and abilities ofstudents on the occupational health and safety management system at enterprises, taking into account industry specifics. Contents: regulatory and legal framework for occupational safety; harmful production factors; accidents and occupational diseases at work; industrial sanitation and occupational health; regulatory and technical regulation in the field of industrial safety; measures to protect employees at the enterprise	5			v						v			
26.	Applied Metrology	Purpose: Study of the practical application of developments in theoretical and legal metrology. Content: Consideration of issues of creating and improving measurement methods covering all aspects of metrological support.	5				v						v		v

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
27.	Applied mechanics	The purpose of the discipline is to acquire knowledge of the basics of mechanics and prepare for the study of general engineering and specialized disciplines. The discipline studies general laws of mechanical movements of material bodies and mechanical interactions between them; general methods of research, construction, basic laws and theorems of mechanics, kinematics of mechanisms and machines; deformable bodies are considered, methods of engineering calculations of structures for strength, rigidity and stability are studied.	4					v					v		v
28.	The EAEU Technical Regulation System	The purpose of the discipline is to acquire theoretical andpractical knowledge in the field of technical regulation of EAEU. The main agreements of EAEU, the procedure for the development, adoption and cancellation of technical regulations of the EAEU are considered. As a result, students acquire practical skills in developing an evidence base for the technical regulations of EAEU with technical regulation requirements.	5								v				
29.	Fundamentals of technical regulation in the context of sustainable development	Purpose: Studying the essence, objectives, principles, and legal framework of technical regulation, with an emphasis on its role in ensuring product safety, quality, and compliance with environmental requirements, contributes to the harmonization of international standards, enhancing enterprise competitiveness, and achieving the Sustainable Development Goals (SDG 4). This is achieved through the implementation of innovations, rational resource use, the formation of sustainable production processes, and the creation of an inclusive environment that provides equal access to knowledge and technology for all, including vulnerable population groups. Content: Technical regulations, manufacturer	5				v		v						

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
		liability for product non-compliance, production, operation, storage, transportation, sale, and disposal processes in accordance													
30.	Physics I	Purpose: to study the basic physical phenomena and laws of classical and modern physics; methods of physical research; the influence of physics on the development oftechnology; the relationship of physics with other sciences and its role in solving scientific and technical problems of the specialty. Contents: mechanics, dynamics of rotational motion of a solid body, mechanical harmonic waves, fundamentals of molecular-kinetic theory and thermodynamics, transfer phenomena, continuum mechanics, electrostatics, direct current, magnetic field, Maxwell's equations.	5		v	v		v							
31.	Physics II	Purpose: to form students' knowledge and skills in usingfundamental laws, theories of classical and modern physics, as well as methods of physical research as the basis of a system of professional activity. Contents: harmonic oscillations, damped oscillations, alternating current, wave motion, laws of refraction and reflection of light, quantum optics, laws of thermal radiation, photons,their characteristics, wave function, electrical conductivity of metals, atomic nucleus, its structure and properties, binding energy, radioactivity.	5		v	v		v							

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
32.	Electrical and Electronic Engineering	The purpose of the discipline is to acquire theoretical andpractical knowledge on the basics of electrical engineering and electronics. The basic laws of the processes occurring in electromagnetic and electronic circuits and methods for determining the electrical quantities characterizing these processes are studied. Methods of calculation of DC electric circuits are studied; analysis and calculation of linear AC circuits; analysis and calculation of magnetic circuits. Electromagnetic devices and electrical machines. Fundamentals of electronics and electrical measurements. The element base of modern electronic devices. Fundamentals of digital and microelectronics, microprocessor tools.	5					v							v
33.	Reference base ofthe Republic of Kazakhstan	Purpose: Studying basic information about standards and their significance. Content: Consideration of the basic requirements for state standards, the structure andcomposition of the standard base of the Republic of Kazakhstan, state primary standards of the basic units of the international system of units of physical quantities.	5				v								
34.	Training Practice	Consolidation of theoretical knowledge gained during the study of the basic disciplines "Theoretical foundations of heat engineering", "Energy saving in heat power engineering and heat technology", "Introduction to the specialty", "Heat and mass transfer"; familiarization with the technological processes of heat energy generation; acquisition of practical skills; collection, systematization of available information, factual materials for analysis and preparation of a report; preparation for the study of subsequent specialized academic disciplines.	2		v	v				v					

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№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
Cycle of basic disciplines Component of choice															
35.	Metrology, quality and certification of the software	Purpose: Studying the problems of assessing the qualityand increasing the reliability of software. Content: Consideration of tasks and methods for studying the reliability and quality of software.	5										v		v
36.	Fundamentals of Artificial Intelligence	Purpose: to familiarize students with the basic concepts,methods and technologies in the field of artificial intelligence: machine learning, computer vision, natural language processing, etc. Contents: general definition of artificial intelligence, intelligent agents, information retrieval and state space exploration, logical agents, architecture of artificial intelligence systems, expert systems, observational learning, statistical learning methods, probabilistic processing of linguistic information, semantic models, natural language processing systems.	5		v			v							
37.	Fundamentals of sustainable development and ESG projects in Kazakhstan	Purpose: the goal is for students to master the theoreticalfoundations and practical skills in the field of sustainable development and ESG, as well as to develop an understanding of the role of these aspects in the modern economic and social development of Kazakhstan. Contents: introduces the principles of sustainable development and the implementation of ESG practices in Kazakhstan, includes the study of national and international standards, analysis of successful ESG projects and strategies for their implementation in enterprises and organizations.	5			v						v			
38.	Legal regulation of intellectual property	Purpose: the goal is to form a holistic understanding of the system of legal regulation of intellectual property, including basic principles, mechanisms for protecting intellectual property rights and features of their implementation. Content: The discipline	5	v	v										

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
		covers the basics of IP law, including copyright, patents, trademarks, and industrial designs. Students learn how to protect and manage intellectual property rights, and consider legal disputes and methods for resolving them.													
39.	Statistical methods ofquality management	Purpose: To provide students with basic concepts of the history of the development of statistical quality management methods, including basic models and tools. Contents: History of the emergence of quality management methods, review of the main models of statistical control, analysis of quality tools, including their role in the quality management system.	5							v				v	
40.	Digitalization in the field oftechnical regulation, standardization and conformity assessment	The purpose of the discipline is to acquire theoretical andpractical knowledge in the field of digitalization of the processes of forming mandatory requirements for products. The main provisions of digitalization of production processes and product launch to the market are considered. As a result, students acquire practical skills in creating digital models of new products that meet current mandatory requirements	5				v	v							
41.	Economics of standardization and quality management	Purpose: to form knowledge and skills on economicaspects of enterprises and enhancing production efficiency through quality improvement. Content: study cost of quality, standardization, certification, investment attractiveness, competitiveness, economic evaluation methods, and the state system of standardization and certification, including principles, methods, and relationships between competitiveness and quality of goods.	5							v	v				
42.	ESG principles in inclusive culture	Purpose of the course: It focuses on studying ESG (Environmental, Social, Governance) principles and their interaction with the creation	5			v						v			

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
		of an inclusive culture within an organization. Content: Students will gain knowledge on how implementing ESG principles contributes to corporate social responsibility, sustainable development, and equal opportunities for all employees, including those who may face various forms of discrimination. The course will help students understand the importance of an inclusive culture in achieving long-term business goals and ensuring sustainable organizational development.													
Cycle of profile disciplines University component															
43.	International and interstate standardization	Purpose: Study the essence and significance of standardization in technical regulation, standardization methods, organizational structure of the state standardization system and the state fund of standards. Content: Methods and principles of standardization, organization of the state standardization system, the role of international and interstate standards in the system oftechnical regulation.	4								v	v			
44.	Metrological examination of regulatory documentation	Purpose: Studying the process of conducting metrological examination of documentation, analyzing the selection of parameters for measurement, establishing accuracy requirements, choosing methods and measuring instruments, as well as their metrological maintenance. Content: The procedure for conducting metrological examination, analysis of technical solutions, selection of parameters and measurement methods, accuracy requirements, maintenance ofmeasuring methods and instruments.	5									v			
45.	National standardization system	The purpose of the discipline is to acquire theoretical andpractical knowledge in the field of national standardization. The rules for the development of a national standardization plan,	4								v	v			

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
		the application of standardization documents are considered. As a result, students acquire practical skills in the development and application of national standards.													
46.	Conformity assessment and accreditation in the field of conformity assessment	The purpose of the discipline is to acquire theoretical andpractical knowledge in the field of accreditation and conformity assessment. Regulatory legal acts, standards regulating issues of accreditation and conformity assessment are considered. As a result, students acquire practical skills in conducting procedures for accreditation of conformity assessment bodies, testing, verification and calibration laboratories (centers)	5				v		v						
47.	Standardization in the service sector	The purpose of the discipline is to acquire theoretical andpractical knowledge in the field of studying the regulatory framework in the service sector. The methodsof monitoring and evaluating the quality of services are considered. As a result, students acquire practical skills in the creation and operation of technical committees for standardization	5							v	v				
48.	Industrial internship I	Industrial internship I	2		v	v				v					
49.	Industrial internship II	Industrial internship II	3		v	v				v					
Cycle of profile disciplines Component of choice															
50.	Identification and traceability systems for goods in global trade	Purpose: Studying the technical, informational, and organizational support for the identification and traceability of goods, including the context of WTO agreements and international experience in this field, contributes to increasing supply chain transparency, ensuring product safety, preventing the illegal circulation of goods, and achieving the Sustainable Development Goals (SDG 4). This is achieved	6						v		v				

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
		through the implementation of digital technologies, process standardization, harmonization of international requirements, and the development of inclusive solutions that provide equal access to technologies and participation of all stakeholders, including small enterprises and vulnerable population groups. Content: Analysis of methods and technologies for the identification and traceability of goods, study of WTO agreements and international experience, and development of traceability systems.													
51.	Testing and quality control in production: inclusive approaches and sustainable development	Purpose: Acquiring theoretical and practical knowledge in planning, organizing, and conducting testing and quality control in production, including types of tests, technological processes, measurement uniformity regulations, certification, and quality systems, contributes to improving product reliability and safety, enhancing production processes, complying with international standards, and achieving the Sustainable Development Goals (SDG 4). This is achieved through the implementation of advanced control methodologies, ensuring high-quality standards, and creating inclusive conditions for education and professional development, including support for people with disabilities and other vulnerable groups. Content: Examination of testing and control tasks and types, technological testing processes, requirements for ensuring measurement uniformity, certification, equipment, and technical support for testing and control.	6						v		v				
52.	International standardization and certification	Purpose: To become familiar with the formation and development of international certification and standardization, including the history, organizational structure of ISO and its divisions,	5								v	v			

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
		as well as certificationat the international and regional levels. Contents: History of the development of international standardization, organizational structure of ISO and its divisions (STAKO, PLAKO, CASCO, etc.), ISO activities in the field of certification, IEC international certification systems, participation of international organizations in standardization, national certification systems of various countries.													
53.	Measurement uncertainty	Purpose: Study of measurement theory with an emphasison error estimation and calculation of measurement uncertainty, as well as methods for expressing the results of measurements of physical quantities. Content: Fundamentals of measurement theory, methods for assessing errors and calculating uncertainty, methods for presenting measurement results of physical quantities.	5				v						v		v
54.	Regulatory framework for standardization and certification	Purpose: Mastering knowledge about the regulatory framework of the state standardization and certification system, including the study of regulatory and regulatory and technical documents, for example, the Law on Technical Regulation in the Republic of Kazakhstan. Content: Fundamentals of planning and principles for creating national standards, classification and identification of processes and products, standardization of products, services and technological processes, application of economic and mathematical methods, operating principles of the World Trade Organization and its regulatory framework.	5									v			

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
55.	Ensuring accuracy of measurements	Purpose: Studying the basics of accuracy standardizationin order to acquire the skills of assigning the necessary standards for product parameters and measuring the dimensional accuracy of measuring instruments. Content: Basics of accuracy standardization, methods for assigning standards for product parameters, techniques for measuring the dimensional accuracy of measuring instruments.	5				v							v	
56.	Certification in Project Management	Purpose: Studying certification in project management to acquire professional competencies necessary for the successful implementation of projects. Content: Mastering knowledge, abilities, skills and practical experience in the field of project management, preparation for professional certification in this field.	5		v									v	
57.	Quality management system	Purpose: Learning the fundamentals and principles of quality management systems to ensure continuous process improvement and enhance customer satisfaction. Content: Study of the key components of a quality management system (QMS), including ISO 9001 standards. Analysis of standard requirements and their implementation in organizations. Development of quality policy and strategy. Practical sessions on developing procedures and instructions, conducting internal audits of the QMS. Examination of methods for assessing customer satisfaction and managing changes in the QMS.	5						v					v	
58.	Standardization in ProjectManagement	Purpose: To study a set of recommendations and tips used by teams when working on projects to improve themanagement of employee work and increase performance and business profits. Content: Mastering methods and strategies for effective team work on projects, analyzing recommendations and tips for improving work processes and achieving desired business	5		v									v	

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
		results.													
59.	Standardization and normative-technical documentation: inclusive approaches and sustainable development	Goal: Studying the fundamental principles and methods of developing standards and regulatory-technical documentation, as well as the national standardization system in the Republic of Kazakhstan, contributes to ensuring product quality and safety, harmonization with international requirements, enhancing the competitiveness of domestic goods, and achieving the Sustainable Development Goals (SDG 4). This is accomplished through the implementation of advanced technologies, optimization of production processes, and the creation of an inclusive environment that ensures equal access to knowledge and technology for all, including small businesses and vulnerable groups. Content: Classification, identification, and cataloging of standards; standardization of products, services, and technological processes; technology for developing standards and technical specifications; classification of regulatory documents.	5				v		v						
60.	Standardization tools for sustainable development	Course Objective – Acquisition of theoretical and practical knowledge in the field of an integrated system of quality of life standards. Content: The main methods of quality of life management are examined through the achievement of key sustainable development goals. Standardization tools allow the regulation of production, industry, and consumption	5			v						v			

№	Discipline name	Short description of discipline	Number of credits	Generated education outcomes (codes)											
				EO1	EO2	EO3	EO4	EO5	EO1	EO7	EO8	EO9	EO10	EO1	EO12
		processes, which can have a positive impact on infrastructure, industry, and lean manufacturing.													
61.	Economics of standardization and certification	Purpose: Formation of theoretical knowledge and practical skills of students in the economic aspects of enterprise management and increasing its economic efficiency through improving product quality. Content: Study of the basics of quality costs, standardization and certification processes, criteria for assessing investment attractiveness, analysis of the relationship between competitiveness and quality, methods of economic evaluation of quality improvement measures and the state standardization system.	5	v						v	v				
Module of final attestation Required component															
62.	Writing and defense of the thesis / project	Writing and defense of the thesis / project	8		v	v				v					