



SATBAYEV  
UNIVERSITY

**Institute of Energy and Mechanical Engineering**  
**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

Amount of credits: 240

**Almaty 2022**

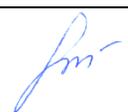
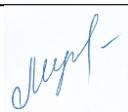
Educational program **6B07502 Standardization, certification and Metrology (by industry)** was approved at the meeting of K.I. Satbayev KazNRTU Academic Council

Minutes # 14 dated «17» 05 2022.

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

Minutes # 8 dated «16» 5 2022 .

Educational program **6B07502 Standardization, certification and Metrology (by industry)** was developed by Academic committee based on direction «**Standardization, certification and Metrology (by industry)**»

Full name	Academic degree/ academic title	Position	Workplace	Signature
<b>Chairperson of Academic Committee:</b>				
Karazhanova D.D.	Candidate of Pedagogical Sciences	Head of the department of SS&M	KazNRTU named after K.I.Satpayev	
<b>Teaching staff:</b>				
Baimakhanov G.A.	Candidate of Chemical Sciences	Associate Professor	KazNRTU named after K.I.Satpayev	
Zhankeldi A.Zh.	PhD	Associate Professor	KazNRTU named after K.I.Satpayev	
Shingissova R.K.	Master's degree	Senior Lecturer	KazNRTU named after K.I.Satpayev	
Kozhageldiyev B.Zh.	Master's degree	Tutor	KazNRTU named after K.I.Satpayev	
<b>Employers:</b>				
Aimagambetova R. Zh	Master's degree	Head of the Department of Strategic Development and Sciences	Republican State Enterprise "KazStandard"	
Mukasheva D.T.		chief specialist of the Department of strategic development and science	Republican State Enterprise "KazStandard"	
<b>Students</b>				
Kapichnikova K.A.	6B07501	3rd year student	KazNRTU	
Askarova Z.A.	6B07501	3rd year student	KazNRTU	

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## **List of abbreviations and designations**

**EP** - educational program;

**RO** - the result of training;

**NQF** - National Qualifications Framework;

**SQF** - Sectoral Qualifications Framework;

**ISO** - International Organization for Standardization;

**EAEU** - Eurasian Economic Union;

**WTO** - World Trade Organization;

**OT** - Labor protection

### **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 personnel in the field of technical regulation, standardization, certification and metrology, focused on ensuring the quality and safety of goods and services, with in-depth professional competencies in the development and implementation of regulatory and technical documentation, quality systems, testing and examination of goods and services and confirmation compliance.

**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.

### 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 personnel who are proficient in developing problems of the impact of standardization, metrology and certification on accelerating scientific and technological progress, improving the safety and competitiveness of products and services, improving product quality management systems, processes, services
6	Purpose of EP	Training of competitive personnel in the field of technical regulation, standardization, certification and metrology, focused on ensuring the quality and safety of goods and services, with in-depth professional competencies in the development and implementation of regulatory and technical documentation, quality systems, testing and examination of goods and services and conformity assessment.
7	Type of EP	New
8	The level based on NQF	6

9	The level based on IQF	6
10	Distinctive features of EP	no
11	List of competencies of educational program	<p>C1. The ability of the individual to socio-cultural and physical development based on the principles of multiculturalism, multilingualism and environmental thinking</p> <p>C2. Willingness to apply digital technologies for the development of production, business, science, social sphere</p> <p>C3. Ability to understand and apply in practice knowledge in the field of social sciences, humanities and natural sciences</p> <p>C4. Ability to master the theory and practice of work in the field of technical regulation, standardization and metrology</p> <p>C5. Ability to perform organizational and managerial activities within the framework of the enterprise strategy</p> <p>C6. Ability to solve professional problems in the field of standardization, conformity assessment and metrology, striving for continuous improvement of professionalism</p>
12	Learning outcomes of educational program	<p>ON1. Use communication skills in professional and interpersonal relationships</p> <p>ON2. Master the basics of philosophical, legal and critical thinking with application in life</p> <p>ON3. Apply a system of knowledge about the surrounding world, human life</p> <p>ON4. Have the necessary level of professional knowledge, skills and qualifications when working with equipment, measuring instruments, standards of units of quantities</p> <p>ON5. Apply digital technologies in various spheres of life</p> <p>ON6. 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</p> <p>ON7. Develop and implement a quality management system in production and organizations</p> <p>ON8. Apply methods of control and analysis of product safety and quality, methods of production and testing of products</p> <p>ON9. Use the skills and abilities to develop and analyze regulatory and technical documents, standards, test methods, products and measuring instruments, design, technological and operational documentation, measurement techniques</p> <p>ON10. To use methods of mathematical processing of the received data, test results, measurements, to assess the state of measurements</p> <p>ON11. Use skills to identify tasks that need to be</p>

		completed to get a certain result
		ON12.Using systematized knowledge, skills and abilities to solve applied problems for the development of professional competencies
13	Education form	Full-time
14	Period of training	4
15	Amount of credits	240
16	Languages of instruction	Kaz.,Rus.
17	Academic degree awarded	Bachelor
18	Developer(s) and authors	Karazhanova D.D., Head of the department of SS&M
		Baimakhanov G.A.,Associate Professor
		Zhankeldi A.Zh., Associate Professor
		Shingissova R.K., Senior Lecturer
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		Mukasheva D.T.,chief specialist of the Department of strategic development and science Republican State Enterprise "KazStandard"
		Kapichnikova K.A., 3rd year student-6B07501
		Askarova Z.A., 3rd year student-6B07501
Shaikenova M.T., 3rd year student-6B07501		

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

№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)											
				ON1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9	ON 10	ON 11	ON 12
<b>Cycle of general education disciplines Required component</b>															
1	English	The purpose of the discipline: to form a multi-level foreign language professionally-oriented competence among students. To develop the ability to realize communicative intention in various situations of professionally-oriented oral and written communication based on four types of linguistic activity: listening, speaking, reading and writing. To teach the usage of a foreign language as a means of accumulating the information for educational, professional and academic communication. Within the framework of the discipline, students master linguistic means, a system for constructing meaningful utterances in a foreign language. Learners report and request information, express their own opinion/judgment, logically and consistently build an oral/written statement for educational, professional as well as academic purposes.	10												
2	Kazakh (Russian) language	The main course goal is upgrading the initial level of proficiency in Kazakh (Russian) language, achieved by them at the previous stage of education, and mastering students necessary and sufficient communicative competence formation for solving social-communicative purposes in various fields of routine, cultural, professional and scientific activities, and also for further self-education.	10												
3	Physical education I	The purpose of the discipline is to provide basic knowledge about the use of physical culture and sports to maintain health and maintain optimal professional performance. To form a motivational and value attitude towards physical culture and focus on a healthy lifestyle, improve health, develop and improve basic	2												

№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)												
				ON1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9	ON 10	ON 11	ON 12	
		motor qualities, communication skills, thinking and self-development														
4	Physical education II	The purpose of the discipline is the practical use of the skills of performing the main elements of the technique of athletics, sports games, gymnastics and a set of standards for general physical training, including professional and applied physical training or one of the sports, methods of conducting independent physical exercises	2													
5	Physical education III	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 sports	2													
6	Physical education IV	The purpose of the discipline is the formation of social and personal competencies of students, ensuring the purposeful use of appropriate means of physical culture and sports to preserve, strengthen health and prepare for professional activity. Familiarization with the natural-scientific foundations of physical education, possession of modern health technologies, basic methods of independent physical education and sports. As part of the course, the student will master the rules of judging by sports	2													
7	Information and Communication technology	The course is designed to form and consolidate the digital skills and competencies of students in an increasingly globalized and digital world. The content of this course is in line with the DigComp conceptual reference model in the European Digital Competence Framework for Citizens. The course aims to develop the digital skills of students in various activities. The course is an introduction to computer hardware, software and communication systems and the study of the	5													

№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)												
				ON1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9	ON 10	ON 11	ON 12	
		functionality of hardware, software and network components of computer systems.														
8	History of Kazakhstan	"History of Kazakhstan" in a holistic form studies historical events, phenomena, facts, processes that reveal historical patterns that took place on the territory of the Great Steppe from the Stone Age to the present day. The purpose of the course: to give the necessary amount of historical knowledge, scientifically reliable facts about the content of the main events of national history from ancient times to the present day, ideas about the continuity and continuity of historical and cultural development, deep roots of spiritual heritage, precedents of humanism, patriotism, creative work of past generations, great personalities of the people, to promote the formation of respect among young Kazakhstanis to historical experience and national traditions.	5													
9	Philosophy	Philosophy forms and develops critical and creative thinking, worldview and culture, provides knowledge about the most common and fundamental problems of life and gives them a methodology for solving various theoretical and practical issues. Philosophy expands the horizon of vision of the modern world, forms citizenship and patriotism, promotes self-esteem, awareness of the value of human existence. It teaches to think and act correctly, develops skills of practical and cognitive activity, helps to look for and find ways and ways of life in harmony with yourself, society, with the world around you.	5													
10	Module of socio-political knowledge (sociology, political science)	The purpose of the course: the formation of theoretical knowledge about society as an integral system, its structural elements, connections and relationships between them, the peculiarities of their functioning and development, as well as the political socialization of technical university students, ensuring the political aspect of training a highly qualified specialist on the basis of modern world and domestic political thought. Tasks of mastering the discipline:	3													

№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)											
				ON1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9	ON 10	ON 11	ON 12
		<p>- the study of the basic values of social and political culture and the willingness to rely on them in their personal, professional and general cultural development;</p> <p>- study and understanding of the laws of the development of society and the ability to operate with this knowledge in professional activities;</p> <p>- ability to analyze social and political problems, processes, etc.</p> <p><b>BRIEF DESCRIPTION OF THE COURSE</b> The discipline is designed to improve the quality of both general humanitarian and professional training of students. Knowledge in the field of sociology and political science is the key to effective professional activity of a future specialist, as well as for understanding political processes, for the formation of political culture, developing a personal position and a clearer understanding of the measure of their responsibility.</p> <p><b>KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE</b> As a result of studying the discipline, the student must know:</p> <p>* features of the sociological approach to the interpretation of the basic concepts and terms of social sciences;</p> <p>* basic classical sociological theories and schools;</p> <p>* key concepts of sociology: society, group, socialization, social facts and social actions, norms, values, social structure, mobility, culture, social institution, social organization, social process, etc.;</p> <p>the basic conceptual apparatus of political science</p> <p>* patterns of socio-economic, political and managerial processes, the main approaches to their study, as well as features of their application;</p> <p>be able to:</p>													

№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)											
				ON1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9	ON 10	ON 11	ON 12
		<p>* describe the processes taking place in society and the observed phenomena using sociological and political science terminology;</p> <p>* explain differences in approaches to the definition of sociological concepts;</p> <p>* to consider social and political phenomena, institutions and processes from different points of view, to argue their own position on the problem, comparing and comparing some theoretical perspectives;</p> <p>to find, analyze and present factual data, analytical information about social groups, political institutions, processes and phenomena, revealing abstract concepts using examples involving data of various kinds;</p> <p>possess:</p> <p>* the ability to use sociological and political science knowledge in practice to analyze phenomena and events of social reality;</p> <p>* skills of independent individual preparation, constructive communication and performing appropriate roles in the implementation of group projects, participation in discussions;</p> <p>* presentation of the results of individual and group analytical work in written and oral form;</p> <p>* skills of academic and grammatically correct written speech, text structuring, source processing, reference apparatus design.</p>													
11	Module of socio-political knowledge (cultural studies, psychology)	Module of socio-political knowledge (cultural studies, psychology) is designed to familiarize students with the cultural achievements of mankind, on their understanding and assimilation of the basic forms and universal laws of the formation and development of culture, on the development of their aspirations and skills to independently comprehend the entire wealth of values of world culture for self-improvement and professional growth. During the course of cultural studies, the student will consider the general problems of the theory of culture, leading cultural concepts, universal patterns and mechanisms of the formation and	5												

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№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)												
				ON1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9	ON 10	ON 11	ON 12	
		development of culture, the main historical stages of the formation and development of Kazakhstani culture, its most important achievements. In the course of studying the course, students acquire theoretical knowledge, practical skills and abilities, forming their professional orientation from the standpoint of psychological aspects.														
<b>Cycle of general education disciplines</b>																
<b>Component of choice</b>																
12	The basics of anti-corruption culture	The discipline studies the essence, causes, causes of sustainable development of corruption from both historical and modern points of view. Considers the prerequisites and impacts for the development of an anti-corruption culture. Studies the development of countering corruption on the basis of social, economic, legal, cultural, moral and ethical norms. He studies the problems of forming an anti-corruption culture based on the relationship with various types of social relations and various manifestations. Situations of conflict of interest and moral choice are analyzed; improving the anti-corruption culture; actions in situations of conflict of interest.	5	✓	✓											
13	Fundamentals of entrepreneurship and leadership	The discipline studies the basics of entrepreneurship and leadership from the point of view of science and law; features, problematic aspects and prospects of development; theory and practice of entrepreneurship as a system of economic, organizational and legal relations of business structures; readiness of entrepreneurs for innovative receptivity. The discipline reveals the content of entrepreneurial activity, career stages, qualities, competencies and responsibilities of an entrepreneur, theoretical and practical business planning and economic expertise of business ideas, as well as risk analysis of innovative development, introduction of new technologies and technological solutions.	5		✓	✓										✓
14	Ecology and life safety	The discipline studies the tasks of ecology as a science, environmental terms, the laws of the functioning of natural systems and aspects of environmental safety in	5				✓									

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№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)												
				ON1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9	ON 10	ON 11	ON 12	
		the conditions of labor activity. Monitoring of the environment and management in the field of its safety. Sources of pollution of atmospheric air, surface, groundwater, soil and ways to solve environmental problems; life safety in the technosphere; natural and man-made emergencies														
<b>Cycle of basic disciplines University component</b>																
15	WTO activities and export promotion	Study and review of the WTO Agreement on technical barriers to trade, sanitary and phytosanitary measures. The main goals, principles and provisions. Cataloging system	6									<b>v</b>				
16	Legislative metrology	This course is designed to study the basic Laws governing legal relations in the field of metrology. The course is devoted to the consideration of general rules, requirements and norms subject to regulation and control by the state, state management (regulation) of metrological activities in the Republic of Kazakhstan	5											<b>v</b>		
17	Engineering and computer graphics	The discipline is aimed at the study of methods for the image of objects and the general rules of drawing, using computer graphics; the study of the basic principles and geometric modeling approach and methodology for developing applications with a graphical interface; the formation of skills in the use of graphic systems for the development of drawings, using 2D and 3D modeling methods	5							<b>v</b>						
18	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 practical skills 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			<b>v</b>						<b>v</b>		<b>v</b>		



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№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)												
				ON1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9	ON 10	ON 11	ON 12	
		distribution of random variables, types and measurement errors														
23	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									✓	✓			
24	Bases of interchangeability	This course is designed to study the concepts of interchangeability, types, tolerances, characteristics and calculation, interchangeability of smooth cylindrical interfaces, tolerances and fits of rolling bearings, accuracy classes. The course is devoted to the consideration of threaded connections, the designation in drawings, the deviation of shapes and the location of surfaces.	5										✓	✓		
25	Fundamentals of standardization and metrology	This course is designed to study the essence, subject, goals of standardization and metrology. The course is devoted to the consideration of physical and non-physical quantities, basic units, additional units, derived units, standards, measuring instruments, measurement techniques, liability for violation of metrological rules.	5			✓							✓			
26	Applied Metrology	This course is designed to study the practical application of developments in theoretical and legislative metrology. The course is devoted to the consideration of the creation and improvement of measurement methods, it is responsible for all issues of metrological support	5				✓								✓	✓
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,	4												✓	✓

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№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)											
				ON1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9	ON 10	ON 11	ON 12
		kinematics of mechanisms and machines; deformable bodies are considered, methods of engineering calculations of structures for strength, rigidity and stability are studied.													
28	The EAEU Technical Regulation System	Study of the main agreements of the EAEU. The procedure for the development, adoption and cancellation of technical regulations of the EAEU	5									✓			
29	Technical regulation	This course is designed to study the essence, objectives, principles, legal basis of technical regulation. The course is devoted to the consideration of the Law "On technical regulation", the content and application of technical regulations, the responsibility of the manufacturer for non-compliance of products, processes of production, operation, storage, transportation, sale and disposal requirements of technical regulations	5									✓			
30	Physics I	Objectives: to study the basic physical phenomena and laws of classical, modern physics; methods of physical research; the relationship of physics with other sciences. The following topics are considered: mechanics, dynamics of rotational motion of a solid body, mechanical harmonic waves, fundamentals of molecular kinetic theory and thermodynamics, transport phenomena, continuum mechanics, electrostatics, direct current, magnetic field, Maxwell equations.	5				✓								✓
31	Physics II	The course studies the laws of physics and their practical application in professional activity. Solving theoretical and experimental-practical educational problems of physics for the formation of the foundations in solving professional problems. Assessment of the degree of accuracy of the results of experimental or theoretical research methods, modeling of physical condition using a computer, study of modern measuring equipment, development of skills for conducting test studies and processing their results, distribution of the physical content of applied tasks of the future specialty.	5				✓								✓

№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)												
				ON1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9	ON 10	ON 11	ON 12	
32	Electrical and Electronic Engineering	The purpose of the discipline is to acquire theoretical and practical 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					✓						✓		
33	Reference base of the Republic of Kazakhstan	Study of basic information about standards. The course is devoted to the consideration of the basic requirements for state standards, the structure and composition of the reference base of the Republic of Kazakhstan, the state primary standards of the basic units of the international system of units of physical quantities.	5				✓							✓		
<b>Cycle of basic disciplines Component of choice</b>																
34	Measurement methods	This course is designed to study various measurement methods (by the nature of the measured value from time to time, by the method of obtaining the result, by the conditions that determine the accuracy of the result, depending on the way the results are expressed), including measurement techniques.	5										✓		✓	
35	Metrology, quality and certification of the software	This course is designed to study the problems of evaluating the quality and improving the reliability of software. The course is devoted to the consideration of tasks and methods of research of reliability and quality of software tools	5				✓	✓		✓						
36	Fundamentals of the theory of reliability of measuring instruments	Theoretical substantiation: systems of concepts and indicators of stability and metrological reliability of measuring instruments; a unified mathematical description of various types of MX SI drift processes;	5				✓							✓		

№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)											
				ON1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9	ON 10	ON 11	ON 12
		analytical expressions of indicators of stability and metrological reliability of measuring instruments, taking into account the peculiarities of their application and metrological service; engineering methods for predicting the metrological reliability of measuring instruments at the design stage; structural methods for improving metrological reliability in design; method of ensuring metrological reliability during operation.													
37	Quality management system	This course is designed to consider the essence, goals and objectives of the creation and functioning of quality management systems. The course is devoted to the study of the quality management system model according to ISO 9000 series standards	5								✓				✓
38	Statistical methods of quality management	This course is designed to provide students with basic concepts about the history of the emergence and development of the foundations and models of statistical methods of quality management. The course is devoted to the consideration of quality tools that form a system of quality control and analysis methods.	5					✓						✓	
39	Digitalization in the field of technical regulation, standardization and conformity assessment	Study of the processes of creating a digital environment for the development of technical regulations and the formation of a list of interrelated standardization documents	5					✓			✓	✓			
<b>Cycle of profile disciplines</b>															
<b>University component</b>															
40	International and interstate standardization	This course is designed to study the essence and role of standardization in the system of technical regulation, standardization methods, organizational structure of the state standardization system and the state standards fund. The course is devoted to the consideration of issues of the international and interstate standardization system	4									✓	✓		
41	Metrological examination of	This course is designed to study basic information about the procedure for conducting metrological examination of documentation. The course is devoted to the analysis	5										✓		

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				ON1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9	ON 10	ON 11	ON 12	
	regulatory documentation	of technical solutions for the selection of measured parameters, the establishment of requirements for measurement accuracy, the choice of methods and measuring instruments, their metrological maintenance														
42	National standardization system	Study of legislation in the field of standardization. Rules for the development and application of national standards. Technical Committees for Standardization	4									✓	✓			
43	Labour safety	The purpose of the discipline is to form knowledge of legislative acts and norms aimed at ensuring occupational safety. In the discipline, students study legal and regulatory documents on labor protection (LP), occupational hygiene and industrial sanitation. Dangerous and harmful production factors, safety measures during installation and operation of technological equipment, emergency situations and elimination of their consequences are considered. In the discipline, they study the basics of LP management, rationing, methods of assessing and forecasting LP, methods of monitoring and auditing LP.	5			✓					✓					
44	Conformity assessment and accreditation in the field of conformity assessment	Study of standard conformity assessment schemes, regulatory legal acts, standards regulating conformity assessment issues. Accreditation of conformity assessment bodies, testing, verification and calibration laboratories (centers)	5				✓		✓			✓				
45	Standardization in the service sector	Study of the regulatory framework in the service sector, the processes of creation and work of technical committees for standardization, the creation of methods for monitoring and evaluating the quality of services	5								✓	✓				
<b>Cycle of profile disciplines</b>																
<b>Component of choice</b>																
46	State control in the field of technical regulation and metrology	This course is designed to study the activities carried out by the authorized state body for standardization, metrology and certification for the control and supervision of compliance with metrological rules and regulations. The course is devoted to the consideration of requirements for measurements, measuring instruments	6							✓		✓				

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№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)												
				ON1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9	ON 10	ON 11	ON 12	
47	Identification and traceability of goods	This course is designed to consider the technical, informational and organizational support for the identification and tracking of goods. The course is devoted to the study of identification and traceability of goods in the context of WTO agreements, international experience in the development of traceability systems of goods.	6							✓		✓				
48	Product testing, control and safety	The purpose of the discipline is to acquire theoretical and practical knowledge of planning, organizing and conducting tests and control in production. The discipline considers the tasks and types of tests and control, the technological process of conducting tests, the provisions and requirements for ensuring the unity of tests. Issues of certification, quality systems of mechanical tests, wear and friction, tests for the effects of vibrations, linear accelerations, shocks, acoustic noise, climatic influences, corrosion. Equipment, technical support for testing and control.	6							✓		✓				
49	Measurement uncertainty	This course is designed to study the basic information of measurement theory in terms of error estimation and calculation of measurement uncertainty. The course is devoted to the consideration of ways to express the results of measurements of physical quantities	5				✓							✓		✓
50	Ensuring accuracy of measurements	This course is aimed at learning the basics of accuracy rationing. Mastering this discipline is necessary to acquire the skills of assigning the necessary accuracy standards for various parameters of products, measuring the accuracy of the dimensions of measuring instruments	5				✓								✓	
51	Theory and practice of project management	The purpose of mastering the discipline is to expand and deepen knowledge about modern project management technology and study the principles of using project management in practical tasks. Mastering the discipline involves an introduction to the problems of project management and the study of project management methodology, familiarization with the tools and methods of project management at all stages of the project life cycle, starting with initialization	5		✓										✓	

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№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)											
				ON1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9	ON 10	ON 11	ON 12
		project, planning its work, organizing their use and control, and ending with completion.													
52	Services in the field of ensuring the uniformity of measurements	This course is designed to study the basics of certification, the national certification system and responsibility for violation of the legislation on certification, certification in foreign countries, in the EAEU. The course is devoted to the consideration of the basic concepts of certification, certification of quality systems, certification of imported products	6				v						v		
53	Sustainable development through standardization tools	A holistic system of quality of life standards. Methods of quality of life management. Development of unified approaches to the adoption of regulatory measures in the fields of economic and social policy	5			v							v		
54	Economics of quality, standardization and certification	This discipline is designed to consider the main provisions for assessing the economic efficiency of the quality of standardization and certification. The course is aimed at determining the economic effect of standardization, calculating the prevention of damage and the cost of certification work, determining the cost of certification work	5							v	v				
55	Capstone Project	The purpose of the discipline is the formation of a complex of theoretical knowledge and practical skills in management, maintenance and support of technical preparation of production. Practical possibilities are considered and professional skills of students to work in a team are formed. Students solve real engineering and technical problems of production, formation and implementation of the life cycle of machine-building products based on the collection of information, critical assessment of the feasibility of the project, in-depth analysis and execution of the project report.	5											v	v

## 5 Curriculum of educational program

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN  
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**SATBAYEV  
UNIVERSITY**



**CURRICULUM**  
of Educational Program on enrollment for 2022-2023 academic year

Educational program 6B07502 "Standardization, certification and metrology (by industry)"  
Group of educational programs B076 "Standardization, certification and metrology (by industry)"

Discipline code	Name of disciplines	Cycle	Total amount in	Total hours	classroom volume	SIS (including TSIS) in hours	Form of control	Allocation of face-to-face training based on courses and semesters														
								I course		II course		III course		IV course								
								1	2	3	4	5	6	7	8							
<b>CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)</b>																						
<b>M-1. Module of language training</b>																						
LNG 108	English language	GED, RC	10	300	0/0/6	210	E	5	5													
LNG 104	Kazakh (Russian) language	GED, RC	10	300	0/0/6	210	E	5	5													
<b>M-2. Module of physical training</b>																						
KFK 101-104	Physical Culture	GED, RC	8	240	0/0/8	120	Difcredit	2	2	2	2											
<b>M-3. Module of information technology</b>																						
CSE 677	Information and communication technologies (in English)	GED, RC	5	150	2/1/0	105	E				5											
<b>M-4. Module of socio-cultural development</b>																						
HUM 137	History of Kazakhstan	GED, RC	5	150	1/0/2	105	SE		5													
HUM 132	Philosophy	GED, RC	5	150	1/0/2	105	E				5											
HUM 120	Socio-political knowledge module (sociology, politology)	GED, RC	3	90	1/0/1	60	E				3											
HUM 134	Socio-political knowledge module (culturology, psychology)		5	150	2/0/1	150	E			5												
<b>M-5. Module of anti-corruption culture, ecology and life safety base</b>																						
HUM 133	Fundamentals of anti-corruption culture	GED, CCH	5	150	2/0/1	105	E				5											
MNG 488	Fundamentals of Entrepreneurship and Leadership																					
CHE 656	Ecology and life safety																					
<b>CYCLE OF BASIC DISCIPLINES (BD)</b>																						
<b>M-6. Module of physical and mathematical training</b>																						
MAT 101	Mathematics	BD, UC	5	150	1/0/2	105	E	5														
PHY 111	Physics I	BD, UC	5	150	1/1/1	105	E	5														
SCM119	Descriptive geometry	BD, UC	5	150	1/0/2	105	E	5														
PHY 112	Physics II	BD, UC	5	150	1/0/2	105	E		5													
<b>M-7. Module of basic training</b>																						
GEN 429	Engineering and computer graphics	BD, UC	5	150	1/0/2	105	E		5													
CHE815	General chemistry	BD, UC	4	120	1/1/1	75	E	4														
SCM121	General theory of measurements	BD, UC	6	180	2/1/1	120	E			6												
SCM107	Legislative metrology	BD, UC	5	150	1/0/2	105	E				5											
SCM100	Fundamentals of standardization and metrology	BD, UC	5	150	1/0/2	105	E				5											
ELC101	Electrical and electronics engineering	BD, UC	5	150	1/1/1	105	E				5											
SCM123	Applied Metrology	BD, UC	5	150	1/2/0	105	E					5										
SCM122	Bases of interchangeability	BD, UC	5	150	1/0/2	105	E						5									
SCM101	The EAEU Technical Regulation System	BD, UC	5	150	1/0/2	105	E							5								
ISO164	Quainmetry	BD, UC	5	150	2/0/1	105	E								5							
MSM460	Metrological support of production	BD, UC	5	150	2/0/1	105	E									5						
SCM120	Technical regulation	BD, UC	5	150	2/0/1	105	E					5										
MSM437	Applied mechanics	BD, UC	4	120	1/1/1	105	E									4						



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MAJOR ELECTIVE DISCIPLINES educational program for the 2022-2023 academic year admission  
Educational program 6B07502 - "Standardization, certification and metrology (by industry)"  
Group of Educational programs B076 - "Standardization, certification and metrology (by industry)"

Full-time study Study duration : 4 years Academic degree: Bachelor of Engineering and Technology

Year of study	Code of elective	Code of discipline	Name of discipline	Semestr	Cycle	Credits	Total hours	lec/lab/pr	SIWT (including SIWT) in
<b>Module of standardization, certification and metrology</b>									
3	3202	MSM172	Statistical methods of quality management	6	BD, CCH	5	150	1/0/2	105
		SCM108	Metrology, quality and certification of the software						
	3203	SCM109	Measurement methods	6	BD, CCH	5	150	1/0/2	105
SCM110		Digitalization in the field of technical regulation, standardization and conformity assessment							
4	3204	SCM111	Quality management system	7	BD, CCH	5	150	1/0/2	105
		MSM174	Fundamentals of the theory of reliability of measuring instruments						
<b>The module of organization and quality assessment</b>									
4	4303	SCM112	State control in the field of technical regulation and metrology	7	PD, CCH	6	180	2/0/2	120
		SCM113	Services in the field of ensuring the uniformity of measurements						
	4304	MSM441	Test, control and security products	7	PD, CCH	6	180	2/0/2	120
		SCM114	Identification and traceability of goods						
	4305	SCM115	Economics of quality, standardization and certification	8	PD, CCH	5	150	1/0/2	105
		SCM116	Development and implementation of technical regulations						
	4306	SCM117	Measurement uncertainty	8	PD, CCH	5	150	1/0/2	105
		SCM118	Ensuring accuracy of measurements						
<b>Management training module</b>									
4	4307	MNG481	Theory and practice of project management	8	PD, CCH	5	150	2/0/1	105
		MSM418	Capstone Project					1/2/0	

Credits numbers of elective disciplines over the entire period of study	
Cycle of disciplines	Credits
Cycle of basic disciplines (B)	15
Cycle of special disciplines (S)	27
<b>Overall:</b>	<b>42</b>

Decision of the Academic Council of the Institute E&ME, Protocol № 2 or "13" 04 2023.

ME,SC&M Department Head

D. Karazhanova

Representative of the Council for EP from Employers

R. Aimagambetova

## 6 Additional educational programs (Minor)

<b>Name of additional educational programs (Minor) with disciplines</b>	<b>Total number of credits</b>	<b>Recommended semesters of study</b>	<b>Documents on the results of mastering the additional educational programs (Minor)</b>