ALIKHAN BOKEIKHAN UNIVERSITY

MODULAR EDUCATIONAL PROGRAM
6B07527 -«Standardization, certification and Metrology in construction»

Semey, 2022

Developed by the Department of Information and Technical Sciences
Discussed and approved at a meeting of the Department of Information and Technical Sciences
Protocol №. 9 dated April 13, 2022
Considered and recommended for approval at a meeting of the Academic Council on the quality of the faculty
Protocol № 7 dated May 19, 2022
Considered and recommended for approval at a meeting of the educational and methodological council of the university
Protocol № 5 dated May 25, 2022

Discussed and approved at a meeting of the Department of Information and Technical Sciences
Protocol №. 1 dated September 8, 2022
Considered and recommended for re-approval at a meeting of the Academic Council on the quality of the faculty
Protocol №. 1 dated September 21, 2022
Considered and recommended for re-approval at a meeting of the educational and methodological council of the university
Protocol №. 1 dated September 22, 2022

CONTENT

Summary of the educational program

1. Explanatory note

The program of modular education (MBU) " State mandatory standard of higher education of the Republic of Kazakhstan Bachelor's degree.General provisions approved by the resolution of the government of the Republic of Kazakhstan dated 31.10.2018 No. 604.On the basis of the standard curriculum of the educational program 6b07527 "standardization, certification and Metrology in Construction", approved by the order of the Ministry of education and science of the Republic of Kazakhstan dated 05.08.2016 No. 425; in accordance with P. 01.04/2012 "regulation on the formation of the educational trajectory of Students", Form No. 26 "structure of the mop". The modules of the GP Block include a mandatory component (MC) - 51 credits and a selective component (TC) - 5 credits, common to all educational programs of education, during their training, the graduate must acquire the following competencies:: knowledge of the laws of development of society and its socio-political, legal, economic, environmental foundations, as well as understanding of cultural and historical values, the basics of computer science, language communication and principles of a healthy lifestyle, knowledge of information about the political life of the country.

The modules of the GP Block include a mandatory component (MK) - 51 credits and a selective component (TC) - 5 credits, common to all educational programs, during which the graduate must acquire the following competencies:: be able to understand the laws of development of society and its socio-political, legal, economic, environmental foundations, as well as cultural and historical values, the basics of computer science, language communication and the principles of a healthy lifestyle, be able to learn information about the political life of the country.

The EP block includes disciplines of the University component (IE), which is 33 credits; and the elective component (TC), which is 79 credits. The modules of these disciplines make it possible to form a complex of basic (research), subject and special competencies that the graduate receives.

The KP block includes disciplines of the University component (IE), which is 23 credits; and the elective component (TC), which is 37 credits. The modules of these disciplines make it possible to form a complex of basic and special (developmental, creative, organizat

Final certification Commission-3 credits;

A total of 228 credits (100%) must be mastered by a student who has graduated from the state educational institution.

A total of 24 modules were developed under the MBB.

When developing a modular educational program, together with employers (RSE "Kazakhstan Institute of standardization and certification"), the following recommendations were taken into account:

Implementation of the educational program" standardization, certification and Metrology in construction " in training.

The goal is to train highly qualified specialists who have a competitive level of knowledge, skills and professional skills in the field of technical regulation and Quality Management in the construction industry, who have the necessary professional and personal competencies sufficient for successful activities at the enterprises of the Republic and abroad

Responsibilities:

- ensuring compliance of goods and services with safety norms and rules for the life and health of the consumer, the property of individuals, legal entities, state property, ecology, the environment, in particular, the safety of animals and plants;
- ensuring the safety of objects with the possibility of occurrence of various emergencies;
- promotion of scientific and technological progress;
- ensuring the competitiveness of products and services;
- economical use of all types of resources;
- product compatibility and interchangeability;
- unified system of measurements.

6b07527 Standardization, certification and Metrology in construction: expected results of the modular educational program

ON1 Systematize and summarize legal and economic information for use in professional, including business activities. Analyze, summarize economic information and systematize safety standards for use in professional activities.

ON2 Show knowledge and understanding of mathematical methods of calculations, calculations, and basic concepts of analytical geometry at a professional level..

ON3 Describe the knowledge and skills of using fundamental physical laws and theories, as well as methods of physical research; name solutions to typical problems and use of analogs between phenomena of different nature.

ON4 Explain the acquisition of skills in conducting chemical experiments, knowledge of reagents, knowledge of methods of chemical water treatment, the ability to determine the content of components.

ON5 Analyze and systematize information on standardization objects obtained from various sources; show knowledge about the main principles and provisions of certification in the Republic of Kazakhstan, areas of certification application, schemes and systems for confirming conformity of products and services; study the Laws of the Republic of Kazakhstan "on ensuring the uniformity of measurements", "on technical regulation", " on accreditation in the field of conformity assessment»

ON6 Analyze knowledge of documentation requirements accepted in professional communication; understand oral speech within the professional subject; study the necessary information from foreign language sources.

ON7 to Study the formation of skills to create various genres of monologue texts; to develop the ability to conduct a conversation; to purposefully exchange professional information on a specific topic.

ON8 Select the characteristics of the measuring instrument and their structure schemes;; prepare a study of methods for testing building structures, evaluate the definition of quality indicators of building structures; study the design and technical documentation for measuring, testing and control tools.Organize the development and implementation of quality systems in accordance with international ISO standards; create technologies for designing data models at various levels; create theoretical foundations for quality assurance and quality management of products and processes.Distinguish between the identification of gradations of quality and defects of goods, the causes of their occurrence and measures to prevent the sale of low-quality goods; determine the establishment of principles and methods of commodity research; evaluate the study of the properties and indicators of the assortment.

ON9 Analyze legislative and regulatory legal acts, methodological materials on metrological support of production. analyze the state of metrological support, maintain metrological serviceability of measurement and control tools, plan and perform measurement, testing and control processes, process results; Diagnose the procedure and methods for planning work on metrological control and production support. Determine the acquisition of measurement skills in construction at different stages of manufacturing and installation; distinguish the development of standards, norms, requirements and measurement methods in construction, depending on the type of tasks to be solved; confirm new measurement methods in construction with mandatory compliance with the international quality management system. Organize verification, calibration and repair of measuring instruments. Develop calendar schedules for verification and calibration of measuring instruments; Determine the frequency of maintenance (MAINTENANCE), calibration, and develop schedules for MAINTENANCE and calibration of equipment.

ON10 Study methods for testing building structures, determining the quality indicators of building structures; use computer technology to identify and encode goods; show the calculation of control numbers of the barcode. Discuss calculations of errors, measurement uncertainties, calibration intervals, and instrument service life.

ON11 Calculate the image of a flat shape from the image of a three-dimensional body; evaluate the shape of objects, apply scale; show methods for solving simple geometric problems. Study the requirements of regulatory documents for equipment and measuring instruments. Develop technical documentation for measuring equipment and tools.

ON12 Compare analytical and numerical analysis of electrical circuits under any influence in the time and frequency domain; calculate transients in linear circuits; determine the parameters of four polusniki under different operating modes; analyze energy transfer over long lines.

ON13 set the composition of work operations, construction processes and works; define the composition of processes and operations of construction works; assign its heat treatment in order to obtain the specified structure and properties.Determine the main trends in the development of construction materials production; Confirm the conditions of environmental impact on materials in structures and structures; plan tests of construction materials; develop reports on completed works;

ON14 Approve the choice of the design scheme, limit States, systems of reliability coefficients, calculation and construction of building structures.Analyze design schemes, limit States, system of reliability coefficients, calculation and construction of building

structures; distinguish standards of measurement accuracy and control reliability and choose measurement , testing and control tools; develop a nomenclature of building materials; offer classification of building materials; determine the principles and methods of production of artificial building materials, products and structures; Evaluate the level of product defects, violations in the process or service and compare the result with the requirements of regulatory documentation; analyze and interpret the data obtained during the evaluation, draw conclusions from observations.

1. Graduate competence model

Competencies that must be a graduate of the educational program 6b07527 standardization, certification and Metrology in construction:

General educational competencies

- basic definitions in the field of languages that contribute to the formation of a highly educated person with a broad outlook and culture of the language;
- scientific vocabulary and scientific constructions of technical profile;
- the volume of professional vocabulary necessary for the implementation of professional communication in a foreign language
- use of the Russian (Kazakh) language in everyday and professional communication
- rules for publishing texts of different genres;
- speech norms of the technical sphere of activity;
- fundamentals of business communication.
- conduct a free conversation on different topics;
- work with special literature in a foreign language
- reference literature in Kazakh, Russian and English (with explanatory dictionaries, reference books, encyclopedias, including special terminology);
- competent interpretation in the state, Russian and English languages;
- competent compilation of current documentation in the state, Russian and foreign languages;
- build a constructive dialogue;
- knowledge and skills of managing, planning, organizing and forecasting the labor market; principles and methods of managing the labor market, requirements for the formation and use of Labor resources, their professional training and retraining
- services for expressing your opinion in Kazakh, Russian and English from the point of view of a future specialist in the field of professional activity.

- trilingual education, which contributes to the formation of language competence of future specialists in the field of Information Technology

Key competencies:

- basic definitions in the field of natural science disciplines that contribute to the formation of a highly educated person with a broad outlook and thinking;
- Basic Laws of classical and modern physics and physical phenomena
- Physical Research Methods
- basic concepts of higher mathematics and their applications in various fields;
- fundamental concepts, laws and theories of classical and modern mathematics, methods and techniques for solving specific problems;
- mathematical calculation methods, mathematical intuitions, mathematical culture;
- on analytical geometry at the professional level;
- the essence of the basic concepts, laws, theories of classical and modern physics, their internal interconnection and integrity, the concept of physical laws, the limits of their application, which allows them to be effectively applied in real conditions.
- creation of mathematical models, setting mathematical problems, selection of suitable mathematical methods and algorithms for solving problems, application of numerical methods for solving problems using modern computing techniques;
- conducting high-quality mathematical research based on The conducted mathematical analysis.;
- application of modern mathematical methods for solving applied problems ;
- application of modern physical phenomena and laws in practical activities and interpolation of the results of a physical experiment
- solving generalized typical problems of the discipline (theoretical and experimental-practical training problems) from various branches of physics features;

Professional competencies:

-social and ethical values based on public opinion, traditions, customs, public norms and their orientation in professional activities;
- main sources and historical research;
- On the development of Kazakhstan in the period of civil resistance and in the context of Soviet construction

- definitions of the most important stages of the formation of independent and sovereign Kazakhstan basic terms of historical science;

- main stages, directions, problems of teaching and philosophy;

- goals and objectives of the course; the main content of the course "political science"; mastering the fundamental knowledge of political theory; spectrum of achievements of historical thought in the field of studying ancient culture.

- specific features of the subject of religious studies, signs of religious faith, structure and specifics of religious consciousness;

- Traditions and culture of the peoples of Kazakhstan;

- Fundamentals of the legal system and legislation of Kazakhstan;

- trends in social development of society;

- compliance with the norms of business ethics, ethical and legal norms of behavior;

- identification of general phenomena and certain historical facts;

- independent work with data and historiography, preparation of abstracts, essays and presentations;

- analyze and evaluate important historical events;

- explain their cause-effect relationships;

- independent work with literature of a general humanitarian nature, finding key worldview problems and solving them

- practical skills in applying the knowledge gained in the analy

Table 1. The order of mastering disciplines in the process of forming special competencies

№	Competence	The list of compulsory, elective subjects for the educational program and the sequence of their choice		Expected results
		List of subjects	The order of their study (TMS).)	
1	Special competence	Basics of product identification and labeling / product coding	3	Know: types, forms and means of commercial information; basic regulatory and legal documents in accordance wit the direction and profile of production; requirements for information about commercial products; commodity an accompanying documents, media and composition of labeling, groups of information signs; - Organization and use of the search for regulatory documents in the field of information about goods in professiona activities; - analysis of protests and protests against goods, preparation of conclusions based on the results of the consideration; - application of the organization's standards in trade practice; - assessment of compliance c commodity information with the requirements of regulatory documents. Be able to: meet the requirements for commodity information; use information received from the Interne methodology for searching and using existing technical regulations, standards, sets of rules; work wit advertisements and protests; fundamentals of introducing standards of the organization into trade practice; metho of operational accounting of information data in commercial activities; work with labeling of goods of variou product groups; methods of classification and coding of goods, methods and means of determining the assortmen and quality indicators of goods and ways to preserve the quality of goods
				Know: legislation in the field of identification and coding; regulatory legal acts and methodological materials; type of State classifiers. Be able to: use computer technologies for identification and coding; navigate in the structure of barcodes; perfor calculations of barcode control numbers. Work on the organization of coding in developed countries; international organizations for unification and coding processing of coding results, product coding, technology and organization..

		Quality audit/quality management system audit of products and services	6	Must know: - the main provisions of regulatory documents; -- basic concepts related to quality audit; - goals, principles, types of quality audit and their features; - qualification requirements of experts (auditors) ; - procedures for planning, preparing, conducting a quality audit; - algorithm for preparing and conducting a quality audit. Be able to: - work with standards; - development of questions in preparation for the audit; - development of audit documentation; - preparation of protocols based on the results of the audit; -assessment of actions based on the results of the audit. - fundamentals of production relations when conducting a quality audit. - product quality and Quality Management Management - modern methods and principles of forming a quality management system
				Must know: - the essence, goals and objectives of quality audit; - quality system audits; - audit principles; - stages of the audit; - Quality Management System Audit; - the essence and tasks of internal control, the content of the main normative acts subject to internal control. Be able to: - conducting an audit of the quality system, collecting audit evidence; - use of statistical methods for conducting audits; - creation of an audit sample and evaluation of its results; - conducting an internal audit; - analysis and generalization of audit results;

				- execution of audit results; Should be used - use analytical procedures and methods for selecting documentation and accounting records when conductin inspections; - methodology of the auditor's work; - quality management systems; - development of accounting documentation, corrective and warning actions; - planning of the audit, formation of the schedule and working group of auditors;
		Technology of structural materials / technological machines and equipment	4	Know: methods of obtaining and processing new structural materials and methods of their processing; methods o developing rational programs for the level of concentration quality based on modern technologies; moder technological processes of processing structural materials. Be able to: choose and assign effective technology for manufacturing machine parts; choose methods for obtainin structural materials, technology for manufacturing workpieces, technology for mechanical processing;; To be able to: design and manufacture of technological parts and structures; methods of analysis and search fo materials for the production of this type of product.
				Know: crystallization of metals and alloys; mechanical properties of materials; heat treatment of metals and thei types; importance of chemical heat treatment of steel; properties of non-ferrous metals and alloys. Be able to perform: analysis of microscopic carbon steel; analysis of microscopic cast iron; thermal (loosening an softening) treatment of carbon steel; study of microstructures of aluminum alloys and bacteria; analysis o microstructures of copper and copper alloys. Be able to: mechanical properties of materials; properties and methods of structural and instrumental materials, structures and their reinforcement.
		Unified documentation system / unification and standardization of management documents	5	Know: basic requirements, laws, educational, documentation terminology; methods of classification, unification an standardization of documents, composition of unified documentation systems; rules for compiling and drawing u documents using modern technologies; documentation terminology; legislative and regulatory legal acts an regulatory and methodological materials for documenting management activities; methods and means o documentation; classification of documentation information; description and composition of unified documentatio systems; Unified documentation systems Be able to: correctly draw up documents and draw them up in accordance with state standards; - unify, design form of documents; - create a nomenclature of cases and store documents; - create documents using language option depending on the content and type of document; - unify the texts of documents; - draw up documents in accordanc with the requirements of regulatory acts and state standards; - register accounting for documents; - use unified form of documents.; Should be able to: draw up, draw up, process, record, register, control, Store, systematize documents, prepar documents for archival storage, destroy documents, apply the requirements of regulatory acts and state standards i

				the compilation and execution of documents; develop unified forms of documents and a record of forms o documents; apply new information technologies when creating management documents, developing templates o documents; apply criteria and principles for determining the scientific, historical and practical value of documents
				To know: organizational and administrative documentation for accreditation of OV bodies; Be able to: analyze accreditation documentation, prepare and conduct on-site expertise, perform an audit; Should be able to: analyze negotiation and evaluation methods, accreditation documentation, prepare and conduc an on-site examination, perform an audit.
		Technology for the development of standards and regulatory documents / technology and design of construction products	8	Knowledge of: legal support, legal norms, classification of regulatory documents and standards, principles an methods of creating standards of foreign documents. Be able to: apply legal norms, legislative acts, have practical skills in developing and approving standards and othe regulatory documents. Development of technical specifications. The procedure for agreeing and approving technical specifications. Application, verification procedure, amendments, revision and cancellation of technical specifications
				Know: types of technical, regulatory, legal acts, rules for the development and application of established technica codes of practice. Be able to distinguish the types of technical regulations. The procedure, rules for the development and applicatio of technical regulations. Development of technical specifications. The procedure for agreeing and approving technical specifications Application, verification procedure, amendments, revision and cancellation of technical specifications;
		Regulatory framework for Standardization and certification / normative control of documents in standardization and certification	5	Know: general theoretical principles of standardization, certification and Metrology; basic provisions of the stat system of standardization and certification; methods of standardization; schemes and systems of certification, rule and procedure for certification; organizational, scientific and methodological foundations of Metrology, lega foundations for ensuring the unity of measurement.; To be able to: predict and optimize a suitable number system in the development of standards, apply methods o unification and aggregation; check (calibrate) measuring instruments; control the quality of measurements, pla measurements, check and calibrate measuring instruments; Be able to: master the skills of control and verification; the regulatory framework of Metrology, standardization an certification; the theory of measurements and evaluation of the results of their mathematical measurements.
				Know: classification of measurements by type of measurement and types of measuring instruments; measuring scales; Be able to: use methods of forecasting and optimizing, unification and aggregation of a suitable number system in the development of standards; Must be able to: calculate measurement errors and evaluate measurement results; determine the nomenclature of measured and controlled parameters of products and technological processes, establish

				optimal standards for measurement accuracy and accuracy of control, select measurement and control tools Know: organization and technology of product certification, methods of product quality analysis, composition of work, procedure and rules for conducting engineering inspections of buildings and structures for various purposes; Be able to: participate in the development of new regulatory documents in construction and the revision of existing ones; participate in the preparation and conduct of certification in construction; participate in the work on the organization of a quality control system in construction; inspect measuring instruments and plan work on certification of calibration and testing equipment. Skills: processing and analysis of measurement results,
		Measurement in construction / fundamentals of measurement in construction	6	Know: classification of measurements by type of measurement and types of measuring instruments; measuring scales; Be able to: use methods of forecasting and optimizing, unification and aggregation of a suitable number system in the development of standards; Must be able to: calculate measurement errors and evaluate measurement results; determine the nomenclature of measured and controlled parameters of products and technological processes, establish optimal standards for measurement accuracy and accuracy of control, select measurement and control tools Know: organization and technology of product certification, methods of product quality analysis, composition of work, procedure and rules for conducting engineering inspections of buildings and structures for various purposes; Be able to: participate in the development of new regulatory documents in construction and the revision of existing ones; participate in the preparation and conduct of certification in construction; participate in the work on the organization of a quality control system in construction; inspect measuring instruments and plan work on certification of calibration and testing equipment. Skills: processing and analysis of measurement results,
				Know: basic concepts related to measuring objects; basic concepts related to measuring instruments; patterns o formation of measurement results; organizational, scientific and methodological foundations of Metrologica support; Be able to: evaluate the accuracy of the results obtained and minimize possible errors in measurements. It is impossible to form a modern engineer without mastering the methods of training, Assembly and quality contro of construction structures, construction of buildings and structures.

		Economics of quality , standardization and certification/fundamentals of quality in standardization and certification	7	Know: methods for assessing costs for the quality of products and services, costs for Metrological support Be able to: analyze the main indicators of economic efficiency of Quality Assurance; To be able to: have an understanding of costs in the quality management system; apply methods for determining th cost of costs and work in the field of quality management, standardization and certification, accreditation, conformit assessment.
				Know: the location of key points in the technological process, where it is necessary to constantly and periodicall monitor changes in the properties of raw materials, semi-finished products and finished products. Be able to: distinguish technological features of building materials; Must be able to: determine the nomenclature of measured and controlled parameters of products and technologica processes, establish optimal standards fo
		Building materials production technology / building materials production equipment	7	Know: perform work to ensure quality control of finished products; rational use of raw materials Be able to: solve various engineering problems; evaluate the properties of wall materials and structures; test raw materials; To determine the technology of wall materials and structures for the construction of modern enclosing structures o buildings and structures in accordance with modern standards.
				Know: the choice of calculation schemes, the state of limits, the system of reliability coefficients, the calculatio and assembly of building structures. Be able to: apply modern progressive technologies, especially with a complex of applications of man-made raw materials, cost-effective and contributing to the solution of environmental problems, taking into account th requirements of safety and
		Computer technology in construction / technologies in construction	7	Know: the main quantitative methods used in solving underground and urban construction problems; informatio technologies for designing existing software products and construction facilities. Be able to: process the information obtained in the course of the study by mathematical and statistical methods analyze and understand the research problems taking into account. To acquire new knowledge with the help of Information Technologies and apply them in their practical activities expand and deepen their scientific worldview
				Know: industrial methods of construction of buildings and structures; fundamentals of flow execution, technologica design methods and content of projects for the production of construction and installation works; moder technologies for the construction of buildings and structures. Be able to: apply in practice the knowledge gained during the implementation of Design Work, Production planning work on the construction site and conducting research work on the technology of construction production. Must be able to: develop creative engineering and technical thinking, analyze and evaluate the emerging comple production conditions, make decisions taking into account the basic principles and materials for conductin construction and technological research, prospects for the development of construction production technology.

		Production of building materials / processes and apparatus for the production of building materials	7	Be able to: solve various engineering tasks; evaluate the properties of wall materials and structures; Perform: testing of raw materials; perform work to ensure quality control of finished products; use raw material effectively To be able to: master measuring instruments and methods of performing measurements when conducting qualit control in construction
				Know: the nomenclature of building materials and their properties; features of their structure, raw material resources; the essence of operations and processes for processing raw materials; technology for the production c various building materials, their cost, etc. ; Be able to: competently determine the features of building materials; justify the choice of materials and products i design decisions for the given conditions of their use; ensure the quality of materials; predict the reliability an durability of materials in structures; Materials science basics of obtaining building materials with the necessary properties;
		Technical regulations for the safety of buildings and structures, building materials and products/ safety of building materials and products	8	Know: technology, control methods and properties of modern wall materials and products in accordance with th requirements of current GOST Be able to: solve various tasks; evaluate the properties of wall materials and structures; test raw materials; Be able to: confirm the conformity of products, processes and services, confirm the conformity of quality an production systems; be able to develop a system of mandatory and voluntary certification, legislative and regulator documents
				Know: the basics of construction design, engineering preparation of the construction site in the conditions of nev construction and reconstruction; technical regulations for the construction, repair and reconstruction of building and structures, acceptance and control of the quality of work; Be able to: apply reference and regulatory literature, design and technological support of construction an installation processes, perform specialized inspections of buildings and structures, field and laboratory tests c building materials, products and structures; Develop programs for specialized inspections of buildings and structures, draw up statements of defects and damag to structures, solve complex tasks for quality control of construction and installation works.

Table 2 . Sequence of mastering the disciplines of social and professional interaction

Course	Subjects provided by	Competence	Expected result
1	2	3	4
Modular educational program in the specialty" standardization and certification " (by industry)			
General education subjects			
Required component			
1	Modern History Of Kazakhstan	Social and ethical competencies	Must know: - basic data and historical research; - About the most important events of the XX and early XXI centuries; - On the development of Kazakhstan in the period of civil resistance and in the context of Soviet construction; - basic terms of historical science about the most important stages of the formation of independent and sovereign Kazakhstan; Be able to: - identification of general phenomena and individual historical facts; - be able to independently work with data and historiography, prepare abstracts, essays and presentations; analyze and evaluate important historical events ; ; - explain their cause-effect relationships; - logical thinking, free comment and defense of one's own opinion; - explain the meaning and meaning of basic historical concepts. Should be used: - work with data, historiography and materials of periodicals and the internet; - writing abstracts, reports and essays; - preparation of presentations and speeches; - creating comparative tables; - performing test and situational tasks; - conduct public speeches, discussions and polemics.
1,2	Foreign language	Competence in the field of language	Must know: - the volume of professional vocabulary necessary for the implementation of professional communication in a foreign language; Be able to: - work with special literature in a foreign language;; Should be used: - professional oral and written communication in a foreign language.

1,2	Kazakh (Russian) language	Competence in the field of language	Must know: - use of the Russian (Kazakh) language in everyday and professional communication; Be able to: - work with professional and technical literature, analysis of professional and technical tests, two-way translation; Should be used: -- knowledge and skills of managing, planning, organizing and forecasting the labor market; principles and methods of managing the labor market, requirements for the formation and use of Labor resources, their professional training and retraining;;
1	Information and Communication Technology	Information and communication competence	Must know: -- economic and political factors in the development of information and communication technologies; - features of different operating systems, architecture. Be able to: -- identify the main trends in the field of information and communication technologies; use of information resources to search and store information; - working with spreadsheets, grouping data, creating graphs; - application of methods and means of Information Protection. Should be used: - Development of the DB structure; - design and create presentations, receive data from the server; - create video files; - sasmart-work with applications; - work with services on the e-government website.
2	Philosophy	Social and ethical competencies	Must know: - the main stages, directions, teachings and problems of philosophy; Be able to: - competent philosophical thinking, what affects the ability to independently think over the most important philosophical topics; Should be used: - conceptual and categorical apparatus of philosophy, analytical reading of philosophical texts, critical thinking skills.
Component by choice			
1	Fundamentals of Ecology OBZH / Psychology	General knowledge competence	Must know: - Labor legislation of the Republic of Kazakhstan; - rules of industrial safety, rules and norms of labor protection; - safety requirements and methods of providing first aid in case of accidents;

			- basic methods of protecting production personnel and the population from the possible consequences of accidents, accidents, natural disasters, be able to make decisions in risk situations; - methods for assessing the state of the natural environment; - fundamentals of protection of Natural Resources, flora and fauna; - main legislative, legal and regulatory documents in the field of nature protection and efficient use of Natural Resources; - environmental situation in the region, the Republic of Kazakhstan, the world; - economic mechanism for Environmental Protection. Be able to: - selection of technical means and technologies, taking into account the environmental consequences of their use ;; - control over the parameters and level of negative impact on their compliance with regulatory requirements;; - effective use of means of protection against adverse effects; - development of measures to improve the safety and environmental friendliness of production activities; planning and implementation of measures to improve the sustainability of production systems and facilities;; -participate in the planning of measures to protect production personnel and the population in emergency situations and, if necessary, in carrying out rescue and other urgent work in the elimination of the consequences of emergency situations;; - conduct a competent analysis of the causality of various situations in the field of Environmental Protection; - implementation of a well-founded system of measures in the field of agro-industrial complex; - solving specific tasks in the field of Environmental Protection, linking the solution of production tasks in compliance with the relevant environmental requirements; - planning and organization of environmental work. Should be used: - to solve professional problems, be able to professionally solve cognitive methods, tasks, work in a team, create safe working conditions in the workplace.
			Know:-the essence of the basic psychological composition of the mental state, processes and properties that ensure the survival of a person; - be able to apply them in the practice of activity, taking into account the basic methods of psychology and its economic specifics;-psychological theories of personality,group and collective. Be able to: apply the acquired knowledge in psychology in their practical activities; organize individual and group activities of people, taking into account their psychological characteristics and compatibility; competently use communicative competence in the process of Group joint activities. Should be able to: develop memory, think, analyze and generalize information

2	Political science / sociology/ cultural studies / fundamentals of anti-corruption culture	Social and ethical competencies	Knowledge of the subject and objectives of the course; the main content of the course" political science"; fundamental knowledge of political theory; the range of achievements of historical thought in the field of studying ancient culture. Be able to: independently work with literature of a general humanitarian nature, find key worldview problems and solve them; think logically, systematically and critically; use the resulting philosophical erudition to formulate and argue their opinions on various everyday issues. Should be trained in: analysis of political statements and programs and political forecasting.
			Know: the laws of development and functioning of society; features of the analysis of the modern system of social inequality, social mobility and stratification; be able to: practical skills of self-analysis of the current state of society. the use of basic knowledge in the field of Humanities and Economic Sciences in cognitive and professional activities. Be able to:practical skills of applying the knowledge gained in the analysis of specific social situations. Basic terms and problems of sociology;basic sociological concepts.
			Know: the structure and composition of modern cultural education; cultural studies and philosophy of culture; sociology of Culture, Cultural Anthropology; cultural studies and history of culture; Be able to: distinguish the basic concepts of Cultural Studies: dynamics of culture, language and symbols of culture, cultural codes, intercultural communications, cultural values and norms, cultural traditions, cultural picture of the world, institutions of social culture. Skills: understanding the events of Kazakh and World Culture based on respect and tolerance; skills in analyzing the sources of cultural studies; methods of discussion and polemics
			Should know: Anti-Corruption culture of the Department; Be able to: define a set of basic moral and ethical standards; Skills: working with regulatory documents.
1	Fundamentals of market economy and entrepreneurship	Social and ethical competencies	Know: the basics of Economics and entrepreneurship, marketing, management in educational institutions, industrial institutions and the service sector; Be able to: practice business planning skills. To adapt to the types and nature of market relations.
Basic subjects			
Required component			
1	Mathematics	Competence of Natural Sciences	Must know: the higher mathematics course in the scope of the given program; Be able to: apply modern mathematical methods to solve Applied Problems; Must be able to: apply the achievements of Fundamental Science for the successful study of general theoretical and special technical disciplines, develop mathematical thinking and logic. When choosing mathematical modeling methods for solving specific technical problems.
1	Physics	Competence of Natural Sciences	Must know: - Basic Laws of classical and modern physics and physical phenomena; - Physical Research Methods;

			- the influence of physics as a science on the development of technology; - the relationship of physics with other sciences and its role in solving scientific and technical problems of the specialty; Be able to: -- application of modern physical phenomena and laws in practical activities and interpretation of the results of a physical experiment; - build a model of a physical phenomenon with an indication of the boundaries of application; Should be used: - solving specific physics tasks; - conduct a physical experiment and evaluate the results obtained;
1	Chemistry	Competence of Natural Sciences	Must know: - basic definitions and laws of chemistry; - nomenclature and properties of inorganic compounds; - structure of the atom and systematics of chemical elements; - modern theory of chemical bonding; General Laws of chemical processes, laws of thermochemistry, thermodynamic condition of process probability, existing masses and its application to various chemical processes; -related to the doctrine of solutions, redox reactions and electro-chemical 4 processes, to know the basic concepts and laws;; Be able to: - classification of data, determination of the type of problem, compilation of an algorithm for its solution; - preparation of equations of electrolytic dissociation, molecular and Ionic equations of exchange reactions, hydrolysis, equations of redox reactions, radioactive decay; - writing an expression for equilibrium constants in solutions and heterogeneous systems, estimating the probability of a reaction taking place according to its thermodynamic parameters; - conduct experiments in compliance with safety regulations; Should be used: - independent work with educational and special literature; - planning and conducting the experiment; - planning and conducting the experiment, mastering its results; - solving chemical problems of computational and theoretical nature.
1	Standardization and certification	Professional competencies	Must know: - the essence and content of standardization and certification, the technology for developing standards, the system for monitoring compliance with the mandatory requirements of regulatory documents on standardization;

			- legal and regulatory documents, methodological materials on certification, rules and procedures for approving compliance of products and services, mandatory and voluntary certification system, compliance support scheme, rules for conducting conformity assessment tests; Be able to: - use of information base on standardization, national and international standards, regulatory and technical documents in the field of certification; - application in practice of the rules for the development of standards and amendments and cancellation of standards; - application of methods of quality control of products and processes when carrying out work on conformity assessment;; - application of product quality control methods; - use of computer technologies for planning and conducting work on standardization and conformity assessment; Should be used: - work with regulatory documentation on standardization and certification; - revision of existing standards and other certification documents; - implementation of systematic verification of regulatory documentation on standardization and certification; - study and systematization of advanced domestic and foreign experience in the field of standardization and certification;
2	Professional Kazakh (Russian) language	Competence in the field of language	Must know: - - basic terms and concepts of professional activity in the Kazakh (Russian) language; - rules of ethics of business, professional communication; Be able to:: - work with professional and technical literature, analysis of professional and technical texts, two-way translation; - identify language tools for organizing the text and use them when generating their own opinions on the topic;; Should be used: - - understand the content of general and professional texts; -- scientific and technical translation and oral communication in the form of monologues and dialogues in the specialty; - oral rewriting of the plan, written rewriting-a synopsis of the content; abstract description content, writing an annotation to the text.
2	Professionally oriented foreign language	Competence in the field of language	Must know: - specifics of oral and written speech in the field of professional, scientific, socio-political communication;

			- national and cultural features of the organization of a text in a foreign language within the framework of professional-based conditions; - stylistic features of the vocabulary of a foreign language in the field of professional communication; Be able to: - implementation of professional activities in linguistic, socio-linguistic, information-analytical and communicative aspects;; - formation of one's own verbal and non-verbal behavior in the field of professional and scientific socio-political communication; - adequate application of various language and speech tools to social factors, the state of communication, the status of the interlocutor and his communicative criteria; Should be used: - hear and understand the appropriate level of messages of a business, informational and professional-technical nature; -learns to get acquainted with and read business and scientific and technical documentation, which provides for obtaining information from what has been read and its use in speech.	
2	General Theory of measurement	Professional competencies	Must know: - terms and definitions of the system ensuring the unity of measurement, the international system of SI units; - general laws and measurement rules; - methods and means of measurement; - international system of units of quantities and fundamentals of the theory of dimensionality. Be able to:: - determination of measurement errors and the laws of their distribution; - methods for processing measurement results; - creation of mathematical models of measurement objects; - estimation of errors of functions of close values of parameters; -- implementation of the accumulation of constituent errors, both deterministic and random Should be used: - - processing of measurement results, methodology for calculating measurement errors; -- persuasion about the crucial role of measurements in human knowledge of nature; -- have an idea of the principles of constructing equations of processes for measuring various physical quantities.	
Component by choice				Comp

				o n e n t b y c h o i c e
2	Basics of product identification and labeling / product coding	Professional competencies	Must know: - types, forms and means of commodity information; - basic regulatory and legal documents in accordance with the direction and profile of training; - requirements for the information of commodity products; - commodity and accompanying documents, media and composition of marking, group of information signs; Be able to:: - issuance of an opinion on the conformity (inconsistency) of commodity information for any group of goods; - Organization of search and use of regulatory documents in the field of information about goods in professional activities; - analysis of protests and protests against goods, preparation of conclusions based on the results of their consideration ;; - application of Organization standards in trade practice; - assessment of compliance of commodity information with the requirements of regulatory documentation. Should be used: - be able to meet the requirements for commodity information; - Use of information received from the internet; - methodology for the search and use of existing technical regulations, standards, sets of rules;	

			- work with ads and protests; - fundamentals of the implementation of the organization's standards in trade practice; - methods of operational accounting of information data in commercial activities; - work with labeling of goods of different product groups; - with methods of classification and coding of goods, methods and means of determining indicators of the assortment and quality of goods and ways to preserve the quality of goods.
			Must know: - legislation in the field of identification and coding; - regulatory legal acts and methodological materials; - types of State classifiers. Be able to:: - use of computer technologies for identification and coding; -- orientation in the structure of barcodes; - perform the calculation of barcode control numbers . Should be used: - work on the organization of coding in developed countries; - international organizations for unification and coding; - processing of product coding, coding, technology and organizational results; - methods and means of assessing the compliance of commodity information with the requirements of regulatory documentation; -methods and means of classifying and coding goods, methods and means of determining indicators of the assortment and quality of goods and ways to preserve the quality of goods;-methods and means of natural science disciplines to assess the consumer properties of goods; - with rational ways and methods of storage, transportation and sale of goods.

3	Quality audit/quality management system audit of products and	Professional competencies	Must know: - the main provisions of regulatory documents; -- basic concepts related to quality audit; - goals, principles, types of quality audit and their features; - qualification requirements of experts (auditors) ; - procedures for planning, preparing, conducting a quality audit; - algorithm for preparing and conducting a quality audit. Be able to:: - work with standards; - development of questions in preparation for the audit; - development of audit documentation; - preparation of protocols based on the results of the audit; -assessment of actions based on the results of the audit. Should be used: - fundamentals of production relations when conducting a quality audit. - product quality and Quality Management Management - modern methods and principles of forming a quality management system
			Must know: - the essence, goals and objectives of quality audit; - quality system audits; - audit principles; - stages of the audit; - Quality Management System Audit; - the essence and tasks of internal control, the content of the main normative acts subject to internal control. Be able to:: - conducting an audit of the quality system, collecting audit evidence; - use of statistical methods for conducting audits; - creation of an audit sample and evaluation of its results;

			- conducting an internal audit; - analysis and generalization of audit results; - execution of audit results; Should be used: - use analytical procedures and methods for selecting documentation and accounting records when conducting inspections; - methodology of the auditor's work; - quality management systems; - development of accounting documentation, corrective and warning actions; - planning of the audit, formation of the schedule and working group of auditors
2	Engineering graphics/ engineering graphics and drawing	Professional competencies	Must know: - standards of the unified system of design documentation (EBRD) and requirements for EBRD; - laws, methods and techniques of Projective Drawing; - rules for drawing up and studying design and technological documentation; - rules for the execution of drawings, technical drawings, sketches, geometric structures; - techniques and principles of constructing dimensions; laws of linear perspective and basic methods of creating space on the plane, ways of creating shadows; - architectural and construction design stages and procedures; - technique and consistency of project execution; - requirements of the state standards of the unified system of design documentation (ESR) and the unified system of technological documentation (ESR)); Be able to: - Using AutoCAD computer graphics; solving geometric modeling problems: solving simple spatial problems and geometric modeling problems of any complexity; - use of regulatory documents, catalogs and other documents; - solving problems of a geometric nature on images of spatial forms;; - solving complex compositional tasks when creating volumetric-spatial objects; - execution of working drawings, sketches of parts and architectural and construction drawings using manual graphics techniques; - execution of orthogonal, axonometric and promising projections; correct presentation of graphic technical thought; - self-control over the implementation of the graphic part of the project; - clear and logical presentation of the ideas and content of their project;

			- assessment of the results of their work and adjustment of their activities at each stage; discussion of issues, reasoned defense of their position; - use of state standards, reference and technical literature; Should be used: - solving geometric modeling problems: simple and complex spatial problems, engineering graphics tools; - rules and methods of working with drawing tools, special engineering and construction terminology; - independent creation of an algorithm for solving specific graphical problems; - creation of spatial forms; - design and design of drawings; - approaches to research activities; - the ability to plan, organize and perform work at the appointed time;
2	Electrical engineering / fundamentals of Electrical Engineering	Professional competencies	Must know: - Basic Laws of electrical engineering, methods of analysis of electrical circuits; - Basic Laws of Electrical Engineering for electrical and magnetic circuits; - methods of measuring electrical and magnetic quantities, principles of operation of the main electrical machines and apparatuses, characteristics of their operation and start-up; - parameters of modern semiconductor devices: amplifiers, generators, secondary power supplies, digital converters; Be able to: - - determination of measurement errors and the laws of their distribution, methods for processing measurement results; - reading electrical and electronic circuits, primary converters and actuators; - detection of simple defects, drawing up a specification; Should be used: -- processing of measurement results, calculation of measurement errors; - using the fundamental laws of Electrical Engineering in calculations, the principle of operation of semiconductor instruments, electrical machines and apparatuses;

2	Technology of structural materials / technological machines and equipment	Professional competencies	Know: methods of obtaining and processing new structural materials and methods of their processing; methods of developing rational programs for the level of concentration quality based on modern technologies; modern technological processes of processing structural materials. Be able to: choose and assign effective technology for manufacturing machine parts; choose methods for obtaining structural materials, technology for manufacturing workpieces, technology for mechanical processing; To be able to: design and manufacture of technological parts and structures; methods of analysis and search for materials for the production of this type of product.
			Know: crystallization of metals and alloys; mechanical properties of materials; heat treatment of metals and their types; importance of chemical heat treatment of steel; properties of non-ferrous metals and alloys. Be able to perform: analysis of microscopic carbon steel; analysis of microscopic cast iron; thermal (loosening and softening) treatment of carbon steel; study of microstructures of aluminum alloys and bacteria; analysis of microstructures of copper and copper alloys. Be able to: mechanical properties of materials; properties and methods of structural and instrumental materials, structures and their reinforcement.
2	Theoretical mechanics/general mechanics	Professional competencies	Must know: - Physical foundations of mechanics; - Basic concepts and axioms of theoretical mechanics, methods for transforming force systems, equilibrium conditions of a solid body, methods for determining and accelerating the speed of point motion, basic types of solid physical motion, complex displacement of points, basic problems of mathematical point dynamics, dynamics of a mechanical system should be able to make a general theorem; Be able to:: - Solving problems of theoretical mechanics; - application of methods for converting power systems; - determination of the speed and acceleration of point motion; Should be used: - use of materials studied in all areas; - solving problems related to the displacement of material points ; ; - methods of constructing mathematical models for solving problems of mechanics; - solving practical tasks;
3	Unification of the documentation system / unification and standardization of management documents	Professional competencies	Must know: - basic requirements, patterns of document creation, terminology of document studies; - methods of classification, unification and standardization of documents, the composition of unified documentation systems; - rules for compiling and drawing up documents using modern technologies;

			documentation terminology; -legislative and regulatory legal acts and regulatory and methodological materials on documentation of management activities; - methods and means of documentation; - - classification of documentary information; - description and composition of unified documentation systems Be able to: - correct compilation of documents and their execution in accordance with state standards; - identification and design of forms of documents; - creation of a nomenclature of cases and storage of documents; - compilation of documents using language options depending on the content and type of document; - unification of the texts of documents; - execution of documents in accordance with the requirements of regulatory acts and state standards; - registration of documents; - use of unified forms of documents; Should be used: - creation, execution, processing, accounting, registration, control, storage, systematization, preparation for archival storage, destruction of documents. - application of the requirements of regulatory acts and state standards in the preparation and execution of documents; - development of unified forms of documents and a table of forms of documents; - skills in the development of management documents, the use of new information technologies in the development of document templates; - application of criteria and principles for determining the scientific, historical and practical value of documents;
			Must know: - accreditation of the NGO bodies of organizational and administrative documentation; Be able to:: - analysis of accreditation documentation, preparation and conduct of on-site expertise, execution of audit; Should be used: - methodology of negotiations and evaluation, analysis of documentation on Accreditation, preparation and conduct of an on-site examination, execution of an audit.
3	Building structures/structural materials in construction	Professional competencies	Know: the methodology for calculating building structures by their limit state; the methodology for selecting materials for structural elements and their compounds; the principles of designing building structures.

			Be able to: perform calculations of building structures made of reinforced concrete, steel and aluminum, wood. To be able to: methodology for designing building structures using existing regulatory documents and applied computer programs
			Know: technological processes in the production of building materials and structures made of them. Regulatory requirements for processes and materials. Working conditions of materials and structures in structures. Be able to: develop a technical task for the technology of manufacturing concrete and reinforced concrete structures. The ability to: conduct comprehensive research using standard and certification tests, apply in practice modern concepts about the influence of micro - and nano-structure on the properties of materials, their interaction with the environment, fields, energy parts and radiation
3	Patentology/Patent and scientific and technical documentation	Professional competencies	Must know: - basic provisions and definitions of patent law; - regulatory legal acts on patenting; - Basic concepts used in the field of patentology; - the main objectives, principles and criteria of patenting; - rules for registration of patent documentation; - the structure of the National patenting system and the competence of the bodies included in this structure; - rights of patent holders-authors; - international and regional organizations on pathetology; Be able to:: - application of legislative and regulatory legal acts, methodological materials on patenting;; - analysis of technical objects; - compilation of a description and formula of the invention from a set of essential features of the developed object, determination and proof of its protecti E ability, as well as registration of application documents for the issuance of a patent; - application of principles and criteria in the field of patenting; - protection of its patent developments as objects of intellectual property; Should be used: - with basic concepts in the field of patenting; - creation of new technological processes based on a systematic approach to the studied objects, development of technological equipment and product designs; - Organization of work on patenting; - correct registration of patent documentation;

3	Regulatory framework for Standardization and certification / rationing of documents in standardization and certification	Professional competencies	Know: general theoretical principles of standardization, certification and Metrology; basic provisions of the state system of standardization and certification; methods of standardization; schemes and systems of certification, rules and procedure for certification; organizational, scientific and methodological foundations of Metrology, legal foundations for ensuring the unity of measurement.; To be able to: predict and optimize a suitable number system in the development of standards, apply methods of unification and aggregation; check (calibrate) measuring instruments; control the quality of measurements, plan measurements, check and calibrate measuring instruments; Be able to: master the skills of control and verification; the regulatory framework of Metrology, standardization and certification; the theory of measurements and evaluation of the results of their mathematical measurements.
			Know: general theoretical principles of standardization, certification and Metrology; basic provisions of the state system of standardization and certification; methods of standardization; schemes and systems of certification, rules and procedure for certification; organizational, scientific and methodological foundations of Metrology, legal foundations for ensuring the unity of measurement.; To be able to: predict and optimize a suitable number system in the development of standards, apply methods of unification and aggregation; check (calibrate) measuring instruments; control the quality of measurements, plan measurements, check and calibrate measuring instruments; Be able to: master the skills of control and verification; the regulatory framework of Metrology, standardization and certification; the theory of measurements and evaluation of the results of their mathematical measurements.
3	Fundamentals of measurement in construction / measurement in construction	Professional competencies	Know: basic concepts related to measuring objects; basic concepts related to measuring instruments; patterns of formation of measurement results; organizational, scientific and methodological foundations of Metrological support; Be able to: evaluate the accuracy of the results obtained and minimize possible errors in measurements. It is impossible to form a modern engineer without mastering the methods of training, Assembly and quality control of construction structures, construction of buildings and structures.
			Know: organization and technology of product certification, methods of product quality analysis, composition of work, procedure and rules for conducting engineering inspections of buildings and structures for various purposes; Be able to: participate in the development of new regulatory documents in construction and the revision of existing ones; participate in the preparation and conduct of certification in construction; participate in the work on the organization of a quality control system in construction; inspect measuring instruments and plan work on certification of calibration and testing equipment. Skills: processing and analysis of measurement results.
4	Economics of quality, standardization and certification/fundamentals	Professional competencies	Know: methods for assessing costs for the quality of products and services, costs for Metrological support Be able to:analyze the main indicators of economic efficiency of Quality Assurance;

	of quality in standardization and certification		To be able to: have an understanding of costs in the quality management system; apply methods for determining the cost of costs and work in the field of quality management, standardization and certification, accreditation, conformity assessment. Be able to: develop technological features of building materials; Be able to: position the main points in the technological process, where constant and periodic monitoring of changes in the properties of raw materials, semi-finished products and finished products is required. Must be able to: determine the nomenclature of measured and controlled parameters of products and technological processes, establish optimal standards for measurement accuracy and clarity of control, select measuring and control tools
			Be able to: develop technological features of building materials; Be able to: position the main points in the technological process, where constant and periodic monitoring of changes in the properties of raw materials, semi-finished products and finished products is required. Must be able to: determine the nomenclature of measured and controlled parameters of products and technological processes, establish optimal standards for measurement accuracy and clarity of control, select measuring and control tools
	Building materials production technology / building materials production equipment	Professional competencies	Know: perform work to ensure quality control of finished products; rational use of raw materials Be able to: solve various engineering problems; evaluate the properties of wall materials and structures; test raw materials; To determine the technology of wall materials and structures for the construction of modern enclosing structures of buildings and structures in accordance with modern standards.
			Know: the choice of calculation schemes, the state of limits, the system of reliability coefficients, the calculation and assembly of building structures. Be able to: apply modern progressive technologies, especially with a complex of applications of man-made raw materials, cost-effective and contributing to the solution of environmental problems, taking into account the requirements of safety and Environmental Protection. Be able to: control, regulate and manage processes based on current regulatory and technical documents
4	Computer technology in construction / technologies in construction	Professional competencies	Know: the main quantitative methods used in solving underground and urban construction problems; information technologies for designing existing software products and construction facilities. Be able to: process the information obtained in the course of the study by mathematical and statistical methods, analyze and understand the research problems taking into account. To acquire new knowledge with the help of Information Technologies and apply them in their practical activities, expand and deepen their scientific worldview

			Know: industrial methods of construction of buildings and structures; fundamentals of flow execution, technological design methods and content of projects for the production of construction and installation works; modern technologies for the construction of buildings and structures. Be able to: apply in practice the knowledge gained during the implementation of Design Work, Production planning, work on the construction site and conducting research work on the technology of construction production. Must be able to: develop creative engineering and technical thinking, analyze and evaluate the emerging complex production conditions, make decisions taking into account the basic principles and materials for conducting construction and technological research, prospects for the development of construction production technology.
4	Production of building materials / processes and apparatus for the production of building materials	Professional competencies	Be able to: solve various engineering tasks; evaluate the properties of wall materials and structures; Perform: testing of raw materials; perform work to ensure quality control of finished products; use raw materials effectively To be able to: master measuring instruments and methods of performing measurements when conducting quality control in construction
			Know: the nomenclature of building materials and their properties; features of their structure, raw materials resources; the essence of operations and processes for processing raw materials; technology for the production of various building materials, their cost, etc. ; Be able to: competently determine the features of building materials; justify the choice of materials and products in design decisions for the given conditions of their use; ensure the quality of materials; predict the reliability and durability of materials in structures; Materials science basics of obtaining building materials with the necessary properties;
4	Technical regulations for the safety of buildings and structures, building materials and products/ safety of building materials and products	Professional competencies	Know: technology, control methods and properties of modern wall materials and products in accordance with the requirements of current GOST Be able to: solve various tasks; evaluate the properties of wall materials and structures; test raw materials; Be able to: confirm the conformity of products, processes and services, confirm the conformity of quality and production systems; be able to develop a system of mandatory and voluntary certification, legislative and regulatory documents.
			Know: the basics of construction design, engineering preparation of the construction site in the conditions of new construction and reconstruction; technical regulations for the construction, repair and reconstruction of buildings and structures, acceptance and control of the quality of work; Be able to: apply reference and regulatory literature, design and technological support of construction and installation processes, perform specialized inspections of buildings and structures, field and laboratory tests of building materials, products and structures;

			Develop programs for specialized inspections of buildings and structures, draw up statements of defects and damage to structures, solve complex tasks for quality control of construction and installation works.
4	Technology of development of standards and regulatory documents / technology and design of construction products	Professional competencies	Knowledge of: legal support, legal norms, classification of regulatory documents and standards, principles and methods of creating standards of foreign documents. Have practical skills in applying legal norms, legislative acts, developing and approving standards and other regulatory documents
			Know: types of technical, regulatory, legal acts, rules for the development and application of established technical codes of practice. Be able to distinguish the types of technical regulations. The procedure, rules for the development and application of technical regulations. Habituation: development of technical specifications. The procedure for agreeing and approving technical specifications. Application, verification procedure, amendments, revision and cancellation of technical specifications;
Professional disciplines			
Required component			
2	Accreditation of certification bodies and Testing Laboratories/accreditation system in the Republic of Kazakhstan	Professional competencies	Must know: - structure of the accreditation body; - directions and basic principles of international cooperation in the field of standardization, conformity assessment, accreditation; - international, regional, foreign experience in conformity assessment; - General principles of building a quality management system in accordance with ISO 9000 standards; - the main forms of documents; - methods of accreditation and examination procedures; - legal protection of accreditation; Be able to:: - apply the requirements of legislative acts and regulatory documents to accredited laboratories; - Organization of work and compliance with the rules and procedures for accreditation of testing (measurement) laboratories (centers) ; - examination of documents submitted for accreditation, assessment of compliance of the accreditation area of the testing laboratory with the accreditation area of certification bodies, registration of an expert opinion on them with the laboratory's consent to conduct certification tests; - Organization of control tests for a specific product and assessment of the qualifications of testers for conducting tests, processing and registration of test results, as well as technical (declared) capabilities of the testing laboratory (Center)); - assessment of compliance of the status of the organization applying for accreditation as a Test (Measurement) Laboratory with the current legislation;

			- make recommendations to eliminate shortcomings in the work of the organization applying for accreditation; - assessment of the organization's compliance with the requirements for testing laboratories of a specific specialty, drawing up an act of certification, if necessary - registration of a reasoned dissenting opinion; - registration of a set of accreditation documents, including an accreditation certificate; - organization and conduct of inspection control of compliance with the requirements of an accredited testing (Measurement) Laboratory (Center), compliance with accreditation criteria, execution of documents and decisions based on the results of inspection control. Be able to:: - With computer technologies for planning and conducting work on standardization, certification; - registration of documentation when conducting accreditation of testing (measurement) laboratories (centers)); - processing of experimental data and assessment of the correctness (uncertainty) of measurements, tests and observations; - registration of test results and making appropriate decisions. Must know: - procedure for the development of regulatory documents, coordination, accreditation of certification bodies and testing centers; Be able to:: - elimination of technical barriers to trade, which largely depends on Accreditation; - Solving tasks on the problems of the certification and accreditation system of the Republic of Kazakhstan. Should be used: - knowledge on the registration, registration and issuance of an accreditation certificate.
3	Quality control of building materials	Professional competencies	Know: quality of product control and process management; methods of quality control; fundamentals of probability theory and various methods of statistical analysis and organization of Product Quality Management; Be able to: determine product quality; use the method of statistical comparison of histograms; check the accuracy of the technological process; use various methods of statistical control and management of product quality at all stages of product movement, ensuring product quality in accordance with state standards and minimum costs; To be able to: use Pareto diagrams; The procedure for accreditation of certification bodies, testing, inspection and Calibration Laboratories; assessment of the quality of products and processes; the concept of basic methods of statistical control and management of the quality of industrial products and consumer goods;

3	Quality systems	Professional competencies	Must know: - evolution of the quality system, development technology and implementation of the quality system at the enterprise, information support of the quality system, the principle of creating a quality management system according to MS ISO 9000, the rules for conducting conformity assessment tests, the rules for approving quality and production system; Be able to:: - conduct an assessment and analysis of the existing quality system at the enterprise, develop and implement a Quality System, Plan internal audit, carry out corrective and preventive actions, improve the quality system; Should be used: - carry out systematic verification of standards and other regulatory documents adopted at the enterprise; - control over the implementation of work on standardization of divisions of the enterprise; - study of the systematization of advanced domestic and foreign experience in the field of development and implementation of quality systems;	
Component by choice				Component by choice

3	Statistical methods of quality management of the construction industry /industrial application of statistical methods of quality assurance	Professional competencies	Must know: - Quality of product control and process management; - quality inspection methods; - Organization of Product Quality Management and the basics of various methods of statistical analysis and probability theory; Be able to: - determination of product quality; - application of the histogram statistical comparison method; - conducting verification of the accuracy of the technological process; - application of various methods of statistical control and management of product quality at all stages of product movement, ensuring product quality that meets state standards and minimum costs; Should be used: -- Application of Pareto diagrams, scatter diagram, Ishikawa diagram, histogram; - procedure for accreditation of certification bodies, testing, verification and Calibration Laboratories; - - quality assessment of products and processes; - proposal on the main methods of statistical control and management of the quality of industrial products and consumer goods;
3	Database and expert systems / database programming	Professional competencies	Must know: - methods and structure of database creation; - basic definitions of Computer Science, Basic and component data structures used in computer technology; - fundamentals of the organization of modern computers and their general characteristics, trends in the development of computer and computer network devices, principles of organizing the use of computer equipment; Be able to: - use the terminology of the subject, the type of database and the method of its implementation, work in one of the database management systems and select the necessary criteria for creating expert systems; - use modern software tools in their activities; Should be used: - creation of a database and product quality assurance system; - basic approaches to the analysis and processing of information using modern information technologies;
2	Fundamentals of calculation and assembly of building structures / fundamentals of	Professional competencies	Know: the choice of calculation schemes, the state of limits, the system of reliability coefficients, the calculation and assembly of building structures. Ensuring compliance of completed design works with current regulatory design documents; use of the necessary regulatory documents, catalogs and other documentation when designing;

	calculation of building structures		Should be able to: organize their activities, choose typical methods and methods of performing professional tasks, evaluate their effectiveness and quality.
			Basic requirements of the unified system of design documentation for construction and standards of the design system for the design and design of architectural and construction drawings; Be able to: make design developments of adjacent parts of the project.; execution of all types of architectural and construction drawings at different stages of design. The use of information and communication technologies in professional activities.
3	Examination of the quality of goods /examination of building materials	Professional competencies	Know: basic concepts of commodity science; objects, subjects and methods of commodity science; general classification of consumer goods, types, properties, assortment indicators; main characteristics of goods; Be able to: identify classification groups of goods; analyze the stages and stages of the technological cycle of goods; To have an idea of the importance of the discipline for professional activity, about the consumer properties of food and non-food products, about the procedure for conducting an examination, standardization, the main directions of its development.
			Know: the procedure for developing, approving and approving documents for new construction and reconstruction of objects; procedures for conducting economic, environmental and technical expertise of Real Estate objects;; Be able to: perform individual sections of technical, environmental, economic expertise of buildings; draw up documents on architectural and construction authorship and technical supervision.; registration of a license for the required type of activity; conducting an examination of the quality management system. - The procedure for developing, approving and approving documents for new construction and reconstruction of objects; types of expertise, the right to state non-departmental expertise; norms, documents and materials to be considered during environmental expertise
4	Design of the production of building materials/fundamentals of the production of building materials	Professional competencies	Know: the basic physical and mechanical properties of building materials, the technology of their manufacture, methods of improving the efficiency of Use; Regulatory Documents of Metrological support; standards of construction production; the basics of Metrology, standardization and certification in the field of production of building materials. Be able to: master and apply effective developments of leading research, design and development enterprises, analyze and select resource-saving technologies, waste-free production, integrated use of local raw materials resources. Be able to: develop a general methodology of professional activity and professional creativity; master the skills of working with modern equipment, be able to use information technologies in the field of professional activity;
			Know: types of building materials and products in accordance with the nomenclature, new design methods and optimization of the composition of building materials adopted in production, new

			technologies used in practice and manufacturing of concrete and reinforced concrete, ceramic, finishing, insulation materials and products, technological operations, means of technological equipment for the production and installation of metal structures, international standards in the field of quality management Be able to: develop technological processes, perform technological calculations of production, create and carry out measures to adjust technological parameters of production, material composition in order to ensure or improve the quality of products, draw up technological maps Be able to: control the quality of primary raw materials and products at all stages of the production of building materials and structures, evaluate and control the quality of construction and installation works
4	Labor protection/ labor activity	Professional competencies	Know: the main ways to act in emergency situations Be able to:create safe working conditions To be able to:legal and organizational issues of labor protection
4	International standardization and certification/ standardization and certification in the Republic of Kazakhstan	Professional competencies	Must know: general principles and basic scientific provisions of standardization and certification; basic concepts, terms and definitions related to standardization and certification; indicators of the quality level of products and the basics of its quality management; rules for certification; principles of certification.; Be able to: learn how to work with educational, methodological and reference literature in accordance with the topics included in the program.to learn how to choose a scheme for conducting national certification of products based on certification. Have practical skills in matters related to the development of international standards ISO\ MEC.in matters related to the national certification system based on international certification.

3 table. List of modules for the educational program 6B07527 "standardization, certification and Metrology in construction"

module ь №	Module name	List of subjects included in the module	Block	Semester	Number of credits	Type of control	All credits for the module
M1	*Fundamentals of life safety*	Fundamentals of market economy and entrepreneurship/ Psychology	JBB TK	2	3	Exam	3
M2	*Basics of linguistic training*	Foreign language	JBB MK	1	5	Exam	20
		Foreign language	JBB MK	2	5	Exam	
		Kazakh (Russian) language	JBB MK	1	5	Exam	
		Kazakh (Russian) language	JBB MK	2	5	Exam	
M3	*Functional literacy*	Information and communication technologies (GG.in the language)	JBB MK	1	5	Exam	5
M4	*Natural science subjects*	Mathematics	BP ZHK	1	5	Exam	14
		Physics	BP ZHK	1	4	Exam	
		Fundamentals of electrical engineering / theory of Electrical Engineering	BP TK	4	5	Exam	
M5	*Standardization and certification of goods, coding*	Standardization and certification	BP ZHK	3	5	Exam	14
		Basics of product identification and labeling / product coding	BP TK	3	3	Exam	
		International standardization and certification/standardization and certification	KP TK	8	6	Exam	
M6	*Modern history of Kazakhstan and Kazakhstan's model of interethnic tolerance and social harmony*	Modern History Of Kazakhstan	JBB MK	2	5	State.exam	13
		Political science / sociology/cultural studies / fundamentals of anti-corruption culture	JBB MK	2	8	Exam	
M7	*Mechanics, graphics and materials science.*	Technology of structural materials / technological machines and equipment	BP TK	4	5	Exam	15
		Engineering graphics/engineering graphics and descriptive geometry	BP TK	3	5	Exam	
		Theoretical mechanics/general mechanics	BP TK	5	5	Exam	
M8	*Professional languages*	Professional goose. (Russian.) language	BP ZHK	3	3	Exam	6
		Professionally oriented foreign language	BP ZHK	4	3	Exam	

M9	*Certification quality*	Quality audit/product and service quality system audit	BP ZHK	6	4	Exam	9
		Accreditation of certification bodies and Testing Laboratories/accreditation system of the Republic of Kazakhstan	BP ZHK	3	5	Exam	
M10	*Quality economics*	Quality economics, standardization and certification / fundamentals of quality in standardization and certification	BP TK	7	6	Exam	6
M11	*Measurement system*	General Theory of measurement	BP ZHK	4	5	Exam	14
		Fundamentals of measurement in construction / measurement in construction	BP ZHK	5	6	Exam	
		Fundamentals of calculation and assembly of building structures / fundamentals of calculation of building structures	BP TK	4	3	Exam	
M12	*Regulatory documents*	Unified system of documentation / unification and standardization of Management goods	BP TK	4	3	Exam	14
		Regulatory framework for Standardization and certification / normative control of documents in standardization and certification	BP TK	5	5	Exam	
		Technical regulations for the safety of buildings and structures, building materials and products/safety of building materials and products	BP TK	8	6	Exam	
M13	*Religious studies, Philosophy*	Philosophy	JBB MK	4	5	Exam	8
		Religious studies	JBB MK	5	3	Exam	
M14	*Technological processes and technologies*	Building structures/structural materials in construction	BP TK	5	4	Exam	9
		Computer technology in construction / technologies in construction	BP TK	7	5	Exam	
M15	*Design of enterprises in the construction industry*	Production of building materials / processes and apparatus for the production of building materials	BP TK	7	5	Exam	5
M16		Management control methods	KP TK	6	6	Exam	

	Management control methods	Databases and expert systems / fundamentals of databases	КР ТК	5	5	Exam	11
M17	*Documentation and packaging containers.*	Technology for the development of standards and regulatory documents / technology and design of construction products	КР ТК	8	4	Exam	6
M18	*Fundamentals of scientific research*	Patentology/Patent and scientific and technical documentation	ВР ТК	6	4	Exam	4
M19	*Safety and expertise of building materials*	Examination of the quality of goods/examination of building materials	КР ТК	6	7	Exam	5
M20	*Production of building materials*	Design of the production of building materials/fundamentals of the production of building materials	КР ТК	7	5	Exam	9
		Production technology of building materials / building materials production equipment	БР ТК	7	4	Exam	
M21	*Labor activity*	Labor protection/ labor activity	КП ТК	7	5	Exam	5
M22	*OHT*	Physical education	ОКТ	1,2,3,4	8	Differentiated test	8
M23	*Experience*	Training	ОТ	2	1	Report	13
		Production experience	ОТ	4	2	Report	
		Production experience	ОТ	6	2	Report	
		Production experience	ОТ	8	5	Report	
		Pre-diploma practice	ДАТ	8	3	Report	
M24	*Final state certification*	State exam in the specialty	МЕ	8	1	State.exam	3
		Writing and defending a thesis (project) or passing a state exam in two specialized subjects	ДЖ	8	2	Graduation work	