«T. K. Basenov Institute of Architecture and Construction
Department of "Construction and Building Materials"

EDUCATIONAL PROGRAM
7M07303 Construction and manufacturing of building materials and structures

Education Area code and classification: 7M07 Engineering, Manufacturing and Machine Building Industries
Training area code and classification: 7M073 Architecture and Construction
Group of educational programs: M124 Construction
NRC level: 7
ORC Level: 7
Duration of training: 2
Amount of credits:120

Almaty, 2025

Educational program 7M07303 "Construction and production of building materials and structures"

approved at a meeting of the Academic Council of KazNITU named after K.I. Satpayev.

Protocol No. 10 **from** " **06** " _ **03** _ 20 **25**

Reviewed and recommended for approval at a meeting of the Educational and Methodological Council of KazNITU named after K.I. Satpayev.

Protocol No. **3** dated " **20** " _**12**_ 20 **24**

Educational program 7M07303 " Construction and production" Building Materials and Structures " developed by the Academic Committee for the 7M073 "Architecture and Construction " program

Full name	Academic degree/ academic title	Job title	Place of work	Signature
Chairman of the Academic Committee:				
Shayakhmetov Saulet Berlikashovich	Doctor of Technical Sciences	Professor	NJSC "Kazakh National Research Technical University named after K.I. Satpayev"	
Faculty:				
Dzholdasova Kuralai Kairberlinovna	Candidate of Technical Sciences	Candidate of Technical Sciences	NJSC "Kazakh National Research Technical University named after K.I. Satpayev"	
Uskembaeva Baghdat Oralbekovna	Candidate of Technical Sciences	Associate Professor	NJSC "Kazakh National Research Technical University named after K.I. Satpayev"	
Kurmanova Sholpan	Candidate of Technical Sciences	Senior Lecturer	NJSC "Kazakh National Research Technical University named after K.I. Satpayev"	
Kaipova Asem Adaevna	Candidate of Technical Sciences	Senior Lecturer	NJSC "Kazakh National Research Technical University named after K.I. Satpayev"	
Zhangabylova Aigul Mamytovna	Candidate of Technical Sciences	Senior Lecturer	NJSC "Kazakh National Research Technical University	

			named after K.I. Satpayev"	
Kystaubaev Saken Bakytzhanuly	Master of Engineering sciences (doctorate)	Senior Lecturer	NJSC "Kazakh National Research Technical University named after K.I. Satpayev"	
Employers:				
Nusupov Dzhetybay Kozhabekovich	Candidate of Technical Sciences	Head of Geo Trak LLC	GEOTRAK LLC	
Alimkulov Murat Mametkulovich	Candidate of Technical Sciences, Associate Professor of the Higher Attestation Commission.	Chief Engineer	TOO ISTgroop Co	
Students				
Yerzhan Balnur Erzhankyzy	-	2nd year student	NJSC "Kazakh National Research Technical University named after K.I. Satpayev"	
Tursunov Abubakir Akbarzhanovich	-	2nd year student	NJSC "Kazakh National Research Technical University named after K.I. Satpayev"	

Kvalidation:

Qualifications and positions are determined in accordance with the "Qualification directory of positions of managers, specialists and other employees", **y**approved by the Order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated May 21, 2012 No. 201-p-m (as amended on May 17, 2013). Graduates of the specialty 7M07303 " Construction and production of building materials and constructs" can work in the following positions:

- master of Technical Sciences: teacher of organizations of higher and secondary professional education; researcher of research institutes; engineer-designer of building structures; engineer-technologist for the production of building materials; engineer for the quality of construction products; design engineer; specialist of production and technical and design organizations; head and specialist of construction companies and construction enterprises specialist of enterprises that produce building materials, products and structures; specialist of organizations in infrastructure sectors of the economy.

Professional competence: the ability to apply moderntheoretical and practical knowledge in the field of construction and production of building materials and structures; the ability to develop and implement innovative technologies for the production of building materials; the ability to perform calculation and design of building structures; possession of modern methods of quality control of construction products; readiness for research, design and production and technological activities; the ability to apply digital and BIM technologies in professional activities..

Table of contents

1. Short description of the program

Field of professional activity: industrial and civil engineering; production of building materials, products and structures; design of buildings and structures; reconstruction and modernization of construction facilities; introduction of innovative technologies and BIM modeling in construction; management of construction production and product quality.

Objects of professional activity:

- local executive authorities in the field of construction and architecture;
- construction design and research organizations;
- construction companies and contractors;
- enterprises that produce building materials, products and structures;
- plants of reinforced concrete, metal and composite structures;
- enterprises of the construction industry and infrastructure sectors of the economy;
- organizations for technical inspection and expertise of buildings and structures.

Masters of the specialty 7M07303 "Construction and production of building materials and structures" can perform the following types of professional activities:

- production and technological infrastructure;
- organizational and managerial support.
- experimental and research activities;
- settlement and project information.
- scientific and research organization;
- educational program.

Functions of professional activity:

Production and technological infrastructure:

- planning and solving technological problems of construction production and production of building materials;
- development and implementation of modern technologies for manufacturing construction products and structures;
- efficient use of raw materials, materials, equipment and digital technologies;
- organization of input quality control of raw materials and production control of products;
- ensuring product compliance with regulatory requirements and standards;
- engineering and technical support for the construction and operation of buildings and structures.

Organizational and managerial support:

- economic and organizational planning calculations in construction and construction industry enterprises;
- organization of work of the labor collective, management of production processes;
- making optimal management decisions in the conditions of construction production;
- ensuring labor protection, safety and environmental safety;
- assessment of production costs and quality assurance of construction products;

- preparation of initial data for making scientific, technical and organizational decisions.

Experimental and research activities:

- development and research of new building materials and technologies;
- analysis of physical and mechanical properties of building materials and structures;
- development of test methods and laboratory research;
- information search and analysis of scientific and technical information;
- participation in development projects;
- introduction of innovative and digital technologies in the construction industry.

Settlement and project information:

- participation in the design of new and reconstruction of existing buildings and structures;
- performing calculations of building structures for strength, stability and durability;
- development of technological schemes for the production of building materials;
- preparation of feasibility studies for the construction and modernization of facilities;
- use of modern calculation software packages and BIM technologies in the design process.

Research and teaching activities:

- conducting scientific research in the field of building materials and structures;
- participation in the development of regulatory and technical documentation;
- knowledge of the basics of civil, financial and economic legislation in the construction sector;
- conducting expertise and consulting on construction production issues;
- organization of the educational process in institutions of higher and secondary vocational education;
- development of educational programs, teaching materials and evaluation tools;
- designing the educational environment and professional development of students.

PASSPORT OF THE EDUCATIONAL PROGRAM

1 Description of the educational program

The duration of the master's degree program is determined by the amount of academic credits completed. Upon completion of the set amount of academic credits and achievement of the expected learning outcomes for obtaining a master's degree, the Master's degree program is considered fully developed. The scientific master's program has 120 academic credits with a 2-year study period.

Planning of the content of education, the method of organizing and conducting the educational process is carried out by the university and scientific organization independently on the basis of credit technology of training.

The Master's program implements educational programs of postgraduate education for the training of managerial personnel with advanced professional training.

The content of the Master's degree program consists of:

1) theoretical training, including the study of cycles of basic and core disciplines;

2) practical training of undergraduates: various types of internships, scientific or professional internships;

3) experimental research work, including the implementation of a master's project;

4) final certification.

Objectives of the educational program:

Assistance in the formation of a graduate's ability to:

- integrate knowledge, deal with complexities, and make judgments based on incomplete or limited information, taking into account the ethical and social responsibility for applying these judgments and knowledge;
- clearly communicate their conclusions and knowledge and their rationale to specialists and non-specialists;
- demonstrate developing knowledge and understanding acquired at the higher education level that is the basis or opportunity for original development or application of ideas, often in the context of scientific research;
- apply knowledge, understanding, and problem-solving abilities in new or unfamiliar situations within the contexts and frameworks of broader (or interdisciplinary) areas related to the field being studied.

Assistance in the formation of a graduate's readiness to:

- develop design documentation for the creation and modernization of elements of the transport industry;
- conduct technical and economic analysis, comprehensive justification of decisions taken and implemented in the field of operation, repair and maintenance of transport complex structures;
- apply the results in practice, strive for self-development, improve their skills and skills;
- economical and safe use of natural resources, energy and materials during operation, repair, and maintenance;

- develop technical documentation and methodological materials, proposals and measures for creation and modernization.

2. Purpose and objectives of the educational program

The goal of the OP is to train highly qualified, competitive and in-demand masters in the scientific and pedagogical direction with organizational and managerial competencies in the field of construction production and design of construction objects

Objectives of the educational program:

Assistance in the formation of a graduate's ability to:

- integrate knowledge in the field of construction, building materials and structures, analyze complex engineering problems and make decisions based on incomplete or limited information, taking into account social, professional and ethical responsibility;
- clearly, logically and reasonably present professional conclusions, research results and design decisions to specialists and non-specialists;
- demonstrate in-depth knowledge and understanding gained at the higher education level as a basis for developing and implementing innovative technologies in construction and construction materials production;
- apply knowledge, skills and competencies in solving professional problems in new, non-standard and interdisciplinary conditions of the construction industry;
- analyze current trends in the construction industry and develop effective engineering solutions.

Assistance in the formation of a graduate's readiness to:

- develop design documentation for the construction, reconstruction and modernization of buildings, structures and building structures;
- design and improve production technologies for building materials, products and structures;
- conduct technical and economic analysis and comprehensive justification of decisions taken in the field of construction, reconstruction and operation of facilities;
- ensure the introduction of resource-saving, energy-efficient and environmentally friendly technologies in construction activities and production of building materials;
- develop technical, regulatory and methodological documentation, as well as proposals for the modernization of construction production;
- apply the results of scientific research in practical activities;
- strive for professional development, professional development and scientific growth;
- carry out research and teaching activities in organizations of higher and secondary vocational education.

3. Requirements for evaluating the learning outcomes of an educational program

3.1 Requirements for applicants

The previous level of education of applicants is higher professional education (bachelor's degree). The applicant must have a diploma of the established standard and confirm the level of English language proficiency with a certificate or diplomas of the established standard.

The procedure for admission of citizens to the master's program is established in accordance with the"Standard Rules for Admission to study in Educational organizations that implement educational programs of postgraduate education".

The formation of a contingent of undergraduates is carried out by placing a state educational order for the training of scientific and pedagogical personnel, as well as paying for training at the expense of citizens ' own funds and other sources. The State provides citizens of the Republic of Kazakhstan with the right to receive free postgraduate education on a competitive basis in accordance with the state educational order, if they receive this level of education for the first time.

Scientific, experimental and research activities

- implementation of fundamental and applied scientific research in the study of objects of civil and industrial complexes;
- creation of new production technologies;
- performing development work;
- analysis of the state and dynamics of business objects using modern methods and methods;
- production of scientifically based experimental studies on objects of civil complexes;
- conducting standard and certification tests of materials and products;
- implementation of metrological verification of basic measuring instruments, reagents, hydrocarbon raw materials and final products.

Educational (pedagogical) activities

- knowledge of the functions of teaching courses in basic disciplines, technology, organization, planning and management of construction production, performing academic work as a teacher (teacher) in institutions of secondary and vocational education (educational institutions).

At the" entrance", a master's student must have all the prerequisites necessary for mastering the relevant master's degree program. The list of necessary prerequisites is determined by the higher education institution independently.

In the absence of the necessary prerequisites, the master's student is allowed to master them on a paid basis.

3.2 Requirements for completing studies and obtaining a diploma

Degree/ **qualifications awarded**: A graduate of this educational program is awarded an academic Master's degree in Technical Sciences.

A graduate who has completed Master's degree programs must have the following general professional competencies:

- the ability to independently acquire, comprehend, structure and use new knowledge and skills in professional activities, develop their innovative abilities;
- ability to independently formulate research goals, establish the sequence of solving professional tasks;
- ability to apply in practice knowledge of fundamental and applied sections of disciplines that determine the focus (profile) of the master's program;
- the ability to professionally choose and creatively use modern scientific and technical equipment to solve scientific and practical problems;
- ability to critically analyze, present, defend, discuss and disseminate the results of their professional activities;
- proficiency in the preparation and execution of scientific and technical documentation, scientific reports, reviews, reports and articles;
- willingness to lead a team in the field of their professional activities, tolerantly accepting social, ethnic, confessional and cultural differences;
- readiness for communication in oral and written forms in a foreign language to solve problems of professional activity.

A graduate who has completed a master's degree program must have professional competencies that correspond to the types of professional activities that the master's program is focused on:

- *production activities:*
- the ability to independently conduct production, field, laboratory and interpretation work in solving practical problems;
- the ability to professionally operate modern field and laboratory equipment and devices in the field of the master's degree program;
- ability to use modern methods of processing and interpreting complex information to solve production problems;

project activities:

- ability to independently draw up and present projects of research and production works;
- readiness to design complex research and production works while solving professional tasks;

organizational and managerial activities:

- readiness to use practical skills in organizing and managing research and production activities in solving professional problems;
- readiness for practical use of regulatory documents in planning and organizing research and production activities.

When developing a master's degree program, all general cultural and general professional competencies, as well as professional competencies related to the types of professional activities that the master's program is focused on, are included in the set of required results of mastering the master's program.

4. Passport of the educational program

4.1. General information

№	Field name	Note
1	Code and classification of the field of education	7M07 Engineering, manufacturing and machine-building industries
2	Code and classification of training	areas 7M073 Architecture and construction
3	Group of educational programs	M124 Construction
4	Name of the educational program	7M07303 "Construction and production of building materials and structures"
5	Brief description of the educational program	The educational program is aimed at preparing masters of technical sciences those who have in-depth professional knowledge in the field of industrial and civil engineering, design of buildings and structures, development and production of modern building materials, products and structures. The program is aimed at developing students ' competencies in the field of calculation and design of building structures, construction production technology, quality management of construction products, introduction of innovative, resource-saving and energy-efficient technologies, as well as digitalization of construction processes, including the use of BIM technologies. Training in the scientific master's program is carried out for 2 years with the development of 120 academic credits and includes theoretical training, practical training, research work of the master's student and the implementation of the master's thesis. Graduates of the program are prepared for professional activities in design and research organizations, in the construction industry and production of building materials, in construction companies, as well as for scientific and pedagogical activities in organizations of higher and secondary professional education.
6	The purpose of the OP	is to train highly qualified, competitive and in-demand masters of the scientific and pedagogical direction with organizational and managerial competencies in the field of construction

		production and design of construction objects.
7	Type of OP	New OP
8	Level of NRC	7
9	Level of ORC	7
10	Distinctive features of OP	Two-degree OP
11	List of competencies of the educational program:	1. General cultural (universal) competencies The graduate is able to: • analyze and critically comprehend modern problems of science and technology in the field of construction; • integrate knowledge from various fields to solve interdisciplinary problems; • carry out professional communication in the state, Russian and foreign languages; • apply academic writing and scientific argumentation skills; • make decisions taking into account social, ethical and environmental responsibility; • carry out self-development, professional growth and management your own career path.
		2. General professional competencies The graduate is able to: • apply in-depth knowledge in the field of construction mechanics, materials science and construction production technology; • use modern methods of calculation and design of building structures; • apply regulatory and technical documentation in professional activities; • use modern information technologies, including BIM technologies and specialized software complexes; • conduct technical and economic analysis of design and technological solutions; • ensure quality control of construction structures. materials, products and structures; • comply with labor protection, industrial and environmental safety requirements.

		3. Professional competencies The graduate is able to: • develop design documentation for the construction, reconstruction and modernization of buildings and structures; • design technologies for the production of building materials, products and structures; • perform calculations of building structures for strength, stability and durability; • develop and implement innovative and resource-saving technologies in construction; • conduct experimental studies of the properties of building materials and structures; • organize and manage production processes at the enterprises of the construction industry; • develop technical, technological and methodological documentation; • apply the results of scientific research in practical activities; • carry out research and pedagogical activities in the field of higher and professional education.
12	Learning outcomes of the educational program:	PO1: Organize and manage the team's work, developing a strategy to achieve the goals set, actively applying modern communication technologies, including cross-cultural interaction in foreign languages. PO2: Study issues related to the organization of the production process, analyze, process and interpret the results obtained from theoretical and experimental research, using scientific methods and evaluation criteria. RO3: Analyze and implement management innovations in the construction sector using a foreign language, organize the functional and organizational structure of the enterprise taking into account modern standards and technologies, effectively manage projects and production and economic activities of the construction site. RO4: Formulate and solve complex scientific and technical problems in design and construction using modern modeling methods

		and principles of sustainable construction, introducing innovative and environmentally oriented technologies. RO5: Develop and justify the choice of technical solutions for optimizing the production processes of products, building materials and structures, introduce sustainable innovative technologies, apply digital methods of managing technological processes of eco-friendly production of building materials using modern standards and scientific methods. RO6: Provide a qualified solution to problems in the field of design and construction, applying theoretical knowledge and mathematical apparatus of fundamental sciences, develop and adapt methodological materials and training programs, using modern standards and innovative technologies. RO7: Develop and analyze design and administrative documentation in construction, applying modern standards and innovative technologies, participate in updating regulatory legal acts, ensuring compliance of design and estimate documentation with state standards. RO8: Assess and solve complex problems in interdisciplinary areas of the construction industry, applying theoretical knowledge and innovative approaches, including mathematical modeling, project management and modern construction technologies to improve professional skills. RO9: Assess and solve complex problems in interdisciplinary areas of the construction industry, applying theoretical knowledge and innovative approaches, including mathematical modeling, project management and modern construction technologies to improve professional skills. RO10: Study and critically evaluate scientific and technical information, applying modern information technologies to search for and assimilate new knowledge, and effectively present the data obtained within the framework of construction science and practice.
13	Form of study	full
- time 14	Duration of study	2
15	Amount of credits	120
16	Languages of study	Russian, Kazakh, English
17	Academic degree awarded	Master

18	Developers and authors:	Department of "Construction and Building Materials"

4.22. The relationship between the achievability of the generated learning outcomes in the educational program and academic disciplines

#	Name of the discipline	Short description of the discipline	Number of credits	Generated learning outcomes (codes)									
				RO1	RO2	RO3	RO4	RO5	RO6	RO7	RO8	RO9	R10
Cycle of basic disciplines (DB) University component (VC):													
1	Foreign language (professional)	The course is aimed at studying the main problems of scientific knowledge in the context of its historical development and philosophical understanding, the evolution of scientific theories, principles and methods of scientific research in the historical construction of scientific worldviews. The discipline will help you master the skills of developing critical and constructive scientific thinking based on research on the history and philosophy of science. At the end of the course, undergraduates will learn to analyze the ideological and methodological problems of science and engineering activities in the construction of Kazakhstan's science and its development prospects.	3				+				+		
2	History and Philosophy of science	Objective: To study the history and philosophy of science as a system of	3							+			

		concepts of global and Kazakh science. Contents: Subject of philosophy of science, dynamics of science, main stages of historical development of science, features of classical science, non-classical and post-non-classical science, philosophy of mathematics, physics, engineering and technology, specifics of engineering sciences, ethics of science, social and moral responsibility of scientists and engineers.										
3	Higher Education Pedagogy	The course is aimed at mastering the methodological and theoretical foundations of higher education pedagogy. The discipline will help you master the skills of modern pedagogical technologies, technologies of pedagogical design, organization and control in higher education, and skills of communication competence. At the end of the course, undergraduates will learn how to organize and conduct various forms of organizing training, apply active teaching methods, and select the content of training sessions. Organize the learning process based on credit-based learning technology.	3						++		+		

4	Management Psychology	The course is aimed at mastering the tools of effective employee management, based on knowledge of the psychological mechanisms of the manager's activity. The discipline will help you master the skills of decision-making, creating a favorable psychological climate, motivating employees, setting goals, creating a team, and communicating with employees. At the end of the course, undergraduates will learn how to solve managerial conflicts, create their own image, analyze situations in the field of managerial activity, as well as conduct negotiations, be stress-resistant and effective leaders.	3						++		+		
Cycle of basic disciplines (DB) Elective Component (EQ)													
5	Intellectual Property and Research	The aim of this course is to provide undergraduates with the knowledge and skills necessary to understand, protect and manage intellectual property (IP) in the context of research and innovation. The course is aimed at training specialists who can effectively work with IP, protect the results of scientific research and apply them in practice.	5		+	+					+		
6	Mathematical modeling in building materials technology	The aim of the discipline is: mathematical modeling and development of software and	5			+		+			+		

		algorithmic software for creating composite materials with controlled structure and properties, using methods of system analysis and control theory for the synthesis of materials with special properties; as well as modeling kinetic processes for the formation of the structure and properties of new generation materials both structural and parametric modeling.											
7	Fundamentals of scientific research	The purpose of studying the discipline is to study and master the methodology of experimental research with the compilation of statistical research programs, development, summaries and analysis of material, as well as familiarization with the structure of the library, methods of bibliographic search, catalogs and file cabinets, bibliographic descriptions of primary sources, design lists of used literature for scientific works.	5	+		+					+		
8	Earthquake resistance of buildings and structures	Discipline is a component of choice. The purpose of studying the discipline is to acquire in-depth knowledge and skills necessary for a specialist in designing buildings and structures in seismically active areas, mastering the practice of calculating buildings and structures for dynamic loads, including	5			+		+			+		

		seismic ones. The discipline studies the types of dynamic loads, methods of their mathematical description, causes of earthquakes, principles of seismic zoning and microseismic zoning, principles of earthquake classification by score. A new regulatory framework (Eurocodes) for earthquake-resistant construction of civil and industrial buildings and structures. Basic methods for solving differential equations. Calculation of strength and stability of buildings and structures for seismic loads. Advanced technologies of seismic reinforcement of buildings and structures used in the world practice.											
9	The Modern Concretes	Discipline is a component of choice. The purpose of studying the discipline is: innovative technologies in the production of modern types of concrete; classification of innovative technologies that allow changing the structure of concrete at various levels; operational and technical characteristics of concrete that can be improved by using the results of innovative developments	5			+		+				+		
10	Modern standards of calculation and design of structures	The discipline is an elective component. The discipline studies the issues of modeling building	5		+	+						+		

		structures of buildings and structures using software complexes for designing buildings and structures. It covers the main regulatory and technical documentation on the design of building structures and numerical studies of the deformation state of buildings, structures of their joints.											
11	Sustainable Development Strategies	Objective: To train undergraduates in sustainable development strategies to achieve a balance between economic growth, social responsibility and environmental protection. Content: Undergraduates will study concepts and principles of sustainable development, development and implementation of sustainable development strategies, assessment of their effectiveness, as well as international standards and best practices. Cases and examples of successful sustainable development strategies are included.	5		+	+					+		
12	Elasticity and plasticity theory	Objective: to study the basic concepts and assumptions of elasticity and plasticity theories; systems of partial differential equations; basic methods for solving these equations. Knowledge of the basic concepts and assumptions of the theory of elasticity and plasticity for	5		++	+							

		successful solution of problems in the field of design of transport structures. Contents: methods for calculating the structures of transport structures using the main provisions of the theory of elasticity and plasticity.											
Cycle of profile disciplines (PD) University component (VC):													
13	Protection of intellectual property	The purpose of studying the discipline is: formation of a complex of modern knowledge about the essence and methods of intellectual property protection; formation of skills of interpretation and practical application of legal norms in this area for participation in analytical, organizational and managerial, innovativeand entrepreneurial and other types of professional activities; mastering the basics of legal regulation and the operation of legal norms for the protection of intellectual property.	5		++	+							
14	Finite element method in construction problems	Goals and objectives of the discipline: study and practical development of the theory of numerical methods for calculating building structures, which are the basis of modern computer systems and application programs used to develop optimal solutions to design problems. The discipline studies numerical methods of linear	5			+		+			+		

		algebra, numerical methods for solving differential equations with initial and boundary conditions, and the use of numerical methods in solving specific technical problems on a computer.											
15	Fundamentals of Building Modeling and Calculation	The discipline is an elective component. The purpose of the discipline is to teach modern information technologies in the construction industry, software systems LIRA-CAD, Sofistik necessary for the calculation and design of building structures of any complexity. The discipline studies developments in the field of automation of architectural and construction design, means of information and logical computer modeling of construction cycle processes, visualization of information and analytical materials using display tools. Strategic directions of electronic design and construction processes are considered.	5			+		+				+		
16	Project Management in Construction	Discipline is an elective component. The purpose of the discipline is to acquire professional skills and abilities in the organization of construction activities through competent process management, handling software tools. In the course of	5			+		+				+		

		studying the discipline, issues of project management in the field of construction production, ways to increase the efficiency of attracted investments in innovative projects are considered. The training process involves obtaining knowledge on the choice of ways to finance projects, skills in analyzing and systematizing risks that meet the requirements and laws of the market, and familiarization with the development of business plans.											
Cycle of profile disciplines (PD) Elective component (KV)													
17	Dynamics of structures	The discipline "Dynamics of structures" studies methods for determining the stress-strain state of buildings and structures; modern computational algorithms used in calculating the impact of dynamic loads; factors affecting the choice of the calculated dynamic model of a structure and the most rational method for calculating it for fluctuations; preparation of initial data and analysis of the current state of processing the results of calculation of structural elements using computer programs. Develops knowledge that allows applying the new (Eurocodes) regulatory framework of the Republic of Kazakhstan in	5			+		+			+		

		calculations of buildings and structures for dynamic impacts.											
18	Innovative technologies for obtaining construction products and structures	The purpose of mastering the discipline is to form undergraduates ' competencies on the main types of innovative technologies for the production of building materials, products and structures of various functional purposes for solving scientific, technical and technical-economic problems in the field of activity and to develop an organization for the introduction of modern technologies in production. In the course of studying, skills are formed to improve the technological processes of production of construction products, taking into account new achievements in the field of modern equipment and controls.	5		+				+				
19	Modification in building materials technology The	purpose of studying the discipline is to develop research competence by mastering knowledge and practical skills in the field of modifying technologies and properties of building materials and products, with the problems of using production waste and their application in the production of building materials and structures, taking into account modern problems of obtaining new effective materials, usingpractical principles	5		+		+				+		

		and regularities in the production of building materials and products with specified characteristics.											
20	Features in the construction of monolithic buildings	The discipline examines the features of the construction of monolithic buildings. Technologies for the construction of underground structures in urban development. Modern technologies of monolithic construction of buildings and structures. Basic methods of performing certain types and complexes of work in monolithic constructions. Methodology for designing the main parameters of the technological process. Schedules of construction and installation works for monolithic construction of buildings and structures. Construction and installation projects.	5			+		+			+		
21	Spatial coatings	The discipline studies large-span spatial structures, their scope of application and the requirements imposed on them; the main provisions of calculation and design of spatial systems made of reinforced concrete and metal, analysis of the stress state of elements. It covers the study of calculation and construction of elements, joints of nodes and ensuring the spatial stability of structures, forming an assessment	5			+		+			+		

		of technical and economic indicators of spatial structures of coatings of unique buildings and structures.											
22	Silicate-sodium composite binders and concretes based on them The	discipline studies the technology and properties, as well as the purpose and application of silicate-sodium composite binders and concretes based on them, their role and significance in modern construction, in the production of concrete reinforced concrete products, thermal insulation and other materials, improving the efficiency of capital repairs. attachments. The tasks of the discipline consist of studying the technologies for obtaining binders and the physico-chemical bases of their hydration and hardening processes, as well as studying the properties of binders, taking into account various areas of their application in construction.	5			+		+			+		
23	The Modern Geotechnical	Discipline is an elective component. The purpose of the discipline is to study new building standards for designing and calculating foundations according to the norms of the Republic of Kazakhstan developed according to Eurocodes, to master the methodology for calculating building structures according to	5			+		+			+		

		Eurocodes (new norms of the Republic of Kazakhstan). Considers issues of forming knowledge and skills on the basic principles of designing foundations and pits of buildings and structures. Studies the calculation and design of foundations in special areas and the construction of foundations for the reconstruction of buildings and structures.											
24	Modern design of construction objects	The discipline studies the issues of project classification, the modern concept of design of construction objects, the use of an automated design system: AutoCAD, Revit (BIM technologies), LIRA. Develops knowledge of the basics of project management, the use of energy-saving design methods, optimization of network models over time and resources, methodological issues of assessing the strength and reliability of structures and structures.	5	+		+							
25	Modern methods of diagnostics of building materials and structures	The discipline considers an in-depth study of methods of quality control of building materials, means of testing building materials and structures, methods of designing diagnostics and testing of building materials and products, training in modern principles and methods of inspection, diagnostics and	5		+				+				

		assessment of the actual load-bearing capacity of structures during their monitoring; diagnostics and monitoring of structures, their models and samples of structural materials.											
26	Modern technological solutions in the construction industry	Purpose: study The discipline studies innovative technologies in the design of construction production and the construction of modern facilities construction using new construction products and structures.	5			+		+			+		
27	Theoretical foundations of glass-crystal materials	production The aim of the discipline is to train masters who have a deep knowledge of the theoretical foundations of glass-crystal materials technology, representing their role and significance in modern construction and improving the efficiency of capital investments.Information about glass-crystal materials (sitals) and precursors of glass-crystal materials is given. Theoretical issues of homogeneous and heterogeneous nucleation and glass crystallization processes are considered. The questions of justification of the choice of the glass composition, for a glass-crystal material, on the state diagram and system are considered. The basics of selecting catalysts for	5			+		+			+		

		the crystallization of glasses with different chemical compositions and methods for selecting glass heat treatment modes are given. Methods for determining the physical and mechanical properties of glass-crystal materials and calculating the properties of sitallic glasses are discussed. The article considers technologies for manufacturing sitall products based on natural and man-made raw materials.											
28	Technologies of production and installation of reinforced concrete structures	The discipline studies the main methods and techniques of calculation, design and production of modern reinforced concrete structures. Considers issues of manufacturing and installation during the construction of civil engineering objects.	5			+		+			+		

5. Working curriculum of the educational program

1.1. Duration of training 2.0 years

NON-PROFIT JOINT STOCK COMPANY
"KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY NAMED AFTER K.I. SATBAYEV"

SATBAYEV UNIVERSITY

«APPROVED»
Decision of the Academic Council
NPJSC«KazNRTU
named after K.Satbayev»
dated 06.03.2025 Minutes № 10

WORKING CURRICULUM

Academic year	**2025-2026 (Autumn, Spring)**
Group of educational programs	**M124 - "Civil engineering"**
Educational program	**7M07303 - "Civil engineering and production of building materials and structures"**
The awarded academic degree	**Master of Technical Sciences**
Form and duration of study	**full time (scientific and pedagogical track) - 2 years**

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	lek/lab/pr Contact hours	in hours SIS (including TSIS)	Form of control	Allocation of face-to-face training based on courses and semesters				Prerequisites
									1 course		2 course		
									1 sem	2 sem	3 sem	4 sem	
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)													
CYCLE OF BASIC DISCIPLINES (BD)													
M-1. Module of basic training													
LNG213	Foreign language (professional)		BD, UC	3	90	0/0/30	60	E	3				
HUM214	Psychology of management		BD, UC	3	90	15/0/15	60	E	3				
CIV240	Modern standards of design calculation and design	1	BD, CCH	5	150	30/0/15	105	E	5				
CIV262	Seismic resistance of buildings and structures	1	BD, CCH	5	150	30/0/15	105	E	5				
MNG781	Intellectual property and research	1	BD, CCH	5	150	30/0/15	105	E	5				
CIV256	Fundamentals of scientific research	2	BD, CCH	5	150	30/0/15	105	E	5				
CIV265	Modern concrete	2	BD, CCH	5	150	30/0/15	105	E	5				
MNG782	Sustainable development strategies	2	BD, CCH	5	150	30/0/15	105	E	5				
HUM212	History and philosophy of science		BD, UC	3	90	15/0/15	60	E		3			
HUM213	Higher school pedagogy		BD, UC	3	90	15/0/15	60	E		3			
CIV275	Mathematical Modeling in Building Materials Technology	1	BD, CCH	5	150	30/0/15	105	E			5		
CIV259	Theory of elasticity and plasticity	1	BD, CCH	5	150	30/0/15	105	E			5		
M-3. Practice-oriented module													
AAP273	Pedagogical practice		BD, UC	8				R			8		
CYCLE OF PROFILE DISCIPLINES (PD)													
M-2. Module of professional activity													
CIV268	MKP(Finite difference method)in reconstruction tasks		PD, UC	5	150	30/0/15	105	E	5				
SIV205	Project management in construction		PD, UC	5	150	30/0/15	105	E	5				
SIV206	Fundamentals of building modeling and calculation		PD, UC	5	150	30/0/15	105	E		5			
CIV270	Defence of intellectual property		PD, UC	5	150	30/0/15	105	E		5			
CIV251	Modern technological solutions in the construction industry	1	PD, CCH	5	150	30/0/15	105	E		5			
CIV267	The modern design of construction projects	1	PD, CCH	5	150	30/0/15	105	E		5			
CIV260	Dynamics of structures	2	PD, CCH	5	150	30/0/15	105	E		5			

CIV266	Theoretical Foundations for the Production of Glass Crystal Materials	2	PD, CCH	5	150	30/0/15	105	E		5			CIV238
CIV253	Innovative technologies for obtaining building products and structures	2	PD, CCH	5	150	30/0/15	105	E		5			
CIV258	Spatial coatings	1	PD, CCH	5	150	30/0/15	105	E			5		
CIV264	Modified building materials	1	PD, CCH	5	150	30/0/15	105	E			5		
SIV204	Modern geotechnics	2	PD, CCH	5	150	30/0/15	105	E			5		
CIV272	Silicate-sodium composite astringents and concretes based on them	2	PD, CCH	5	150	30/0/15	105	E			5		
CIV254	Modern methods of diagnostics of building materials and structures	2	PD, CCH	5	150	30/0/15	105	E			5		
CIV274	Features in the erection of monolithic buildings	3	PD, CCH	5	150	30/0/15	105	E			5		
CIV255	Technologies for the production and installation of reinforced concrete structures	3	PD, CCH	5	150	30/0/15	105	E			5		
M-3. Practice-oriented module													
AAP274	Research practice		PD, UC	8				R				8	
M-4. Experimental research module													
AAP268	Research work of a master's student, including internship and completion of a master's thesis		RWMS	4				R	4				
AAP268	Research work of a master's student, including internship and completion of a master's thesis		RWMS	4				R		4			
AAP251	Research work of a master's student, including internship and completion of a master's thesis		RWMS	2				R			2		
AAP255	Research work of a master's student, including internship and completion of a master's thesis		RWMS	14				R				14	
M-5. Module of final attestation													
ECA212	Registration and protection of the master thesis		FA	8								8	
Total based on UNIVERSITY:									30	30	30	30	
									60		**60**		

Number of credits for the entire period of study

Cycle code	Cycles of disciplines	Credits			
		Required component (RC)	University component (UC)	Component of choice (CCH)	Total
GED	Cycle of general education disciplines	0	0	0	0
BD	Cycle of basic disciplines	0	20	15	35
PD	Cycle of profile disciplines	0	28	25	53
Total for theoretical training:		**0**	**48**	**40**	**88**
RWMS	Research Work of Master's Student				24
ERWMS	Experimental Research Work of Master's Student				0
FA	Final attestation				8
TOTAL:					**120**

Decision of the Educational and Methodological Council of KazNRTU named after K.Satpayev. Minutes № 3 dated 20.12.2024

Decision of the Academic Council of the Institute. Minutes № 4 dated 10.12.2024

Signed:

Governing Board member - Vice-Rector for Academic Affairs — Uskenbayeva R. K.

Approved:

Vice Provost on academic development — Kalpeyeva Z. B.

Head of Department - Department of Educational Program Management and Academic-Methodological Work — Zhumagaliyeva A. S.

Director of the Institute - Institute of Architecture and Civil engineering named T.K. Bassenov — Kuspangaliyev B. .

Department Chair - Civil engineering and building materials — Shayakhmetov S. B.

Representative of the Academic Committee from Employers ____Acknowledged____ — Omarov Z. A.