«ALIKHAN BOKEIKHAN UNIVERSITY» EDUCATIONAL INSTITUTION
Department of Information and Technology and Economics
Department of Informatics and Mathematics

6B07326 " INDUSTRIAL AND CIVIL CONSTRUCTION"

THE CATALOGUE OF ELECTIVE SUBJECTS

Year of admission – 2021

Term of study: 2 years 7 month (DOT)

Semey, year 2021

Considered and approved at the meeting of educational-methodic Council of the faculty

Minutes №_5_ from 20.05.2021y.

Approved at the meeting of EMC of the University

Minutes № _1_ from 17.09.2021 y.

Awarded degree: bachelor of technology and technology on the educational program 6B07326 " Industrial and civil construction"

Group of education: 6B073 Architecture and construction

Elective course №	The name of subject		Prerequisites	Postrequisites	Short description of the content, the aims of education, expected results
BASIC DISCIPLINES					
Be sure to select(BSS)					
1	Modern materials in construction	1	Physics, Mathematics, I	Construction structures II, Technology of construction production II, Technology of repair and construction works	**Purpose:** training of highly qualified bachelors who know the nomenclature and features of the technology of building materials and products for their rational use in construction. **Contents:** Structure and basic properties of building materials; natural stone materials and raw materials for the production of building materials from rocks; ceramic materials; metal materials; wooden materials; binders. Materials for walls. Materials for partitions. Insulation materials. Waterproofing materials. Acoustic materials. Fireproof materials. Paint and varnish materials. Roofing materials. Materials for interior finishing of walls and partitions. **Expected Result:** **Know:** the main requirements for construction materials and products and technologies of their production, construction and architectural design in practice; professional functions of the technologist and Builder; modern information computer technologies (ICT) used in the practical activities of the technologist and Builder. **Able to:** implement the acquired knowledge and skills in production and design activities; purposefully choose building material for various structures and structures and reasonably use it for the specified operating conditions; use scientific achievements in the field of building materials industry, construction and architecture. **Be competent:** effective use of building materials, quality control of materials at various technological stages of their processing and finished construction products.
1	Artificial building materials	1	Physics, Mathematics, I	Technology of construction structures, technology of installation of metal structures, Organization of repair and construction works and services	**Purpose:** training of highly qualified bachelors who know the nomenclature and features of the technology of building materials and products for their rational use in construction. **Content** Stone materials; Natural building materials; Materials and wood products; Artificial building materials; Binders; Building mortars and concretes; Roofing and insulating materials; Soft (roll) materials; Rigid roofing materials; Finishing materials; Plastering materials; Painting materials. **Expected Result:** **Know:** fundamentals of General energy, including basic methods and methods of energy conversion, technology of electricity production at thermal, nuclear and hydraulic power plants, non-traditional and renewable sources of electricity **Able to:** perform simple calculations of heat

					exchangers and evaluation of thermodynamic efficiency of actual cycles of power plants; **Possess skills:** in work operational requirements to various types of electric power industry; bases of ensuring safety.
2	Architecture of civil and industrial buildings and structures	5	Technical drawing (school course), computer science (school course)	Technology of repair and construction works, Geotechnics II	**Purpose:** formation of a system of knowledge, skills and abilities in the field of architectural and construction design of civil and industrial buildings in modern conditions **Contents:** The main types of industrial buildings. Master plans of industrial enterprises. Unification of industrial buildings and their structures. Space-planning solutions of industrial buildings. Design solutions for single-story industrial buildings. Design solutions for multi-story industrial buildings. Enclosing structures of industrial buildings. Coatings of industrial buildings. Administrative and household buildings and premises in industrial enterprises. **Expected Result:** **Know:** the main requirements for construction materials and products and technologies of their production, construction and architectural design in practice; professional functions of the technologist and Builder; modern information computer technologies (ICT) used in the practical activities of the technologist and Builder. **Able to:** implement the acquired knowledge and skills in production and design activities; purposefully choose building material for various structures and structures and reasonably use it for the specified operating conditions; use scientific achievements in the field of building materials industry, construction and architecture. **Be competent:** effective use of building materials, quality control of materials at various technological stages of their processing and finished construction products.
2	Architecture	5	Technical drawing (school course), computer science (school course)	Organization of repair and construction works and services, Engineering Geology II	**Purpose:** formation of a system of knowledge, skills and abilities in the field of architectural and construction design of civil and industrial buildings in modern conditions. **Content:** General information about architecture and urban planning. Fundamentals of architectural and construction design. General provisions of design of buildings and structures. Structural elements of buildings in connection with space-planning solutions. **Expected Result:** **Know:** scientific and technical information in the field of design of buildings and structures; domestic and foreign experience in the design and construction of facilities; normative documents in the field of design; functional basis for the design of industrial and civil buildings; features of modern load-bearing and enclosing structures. **Able to**: develop design solutions for simple buildings and enclosing structures; perform analysis of space-planning and design solutions of buildings and structures; control the compliance of the developed projects and technical documentation standards, specifications and regulations. **Be competent:** methods of designing buildings for various purposes as a whole, consisting of connected and interacting with each other carriers

					and the ability to conduct a preliminary feasibility study of design calculations; skills of construction of enclosing structures taking into account
3	Engineering geodesy	5	Technical drawing (school course), computer science (school course)	Geotechnics II, Basics of seismology, Strengthening of buildings, water Supply and drainage	**Objective:** obtaining theoretical and practical knowledge on the complex of geodetic works performed during the survey, design, construction, operation of various types of engineering structures. **Contents:** Basic information on geodesy. Geodetic measurements. Types of shooting, their classification. Geodesy in construction. Geodetic support of installation of equipment of thermal and nuclear power plants. Geodetic support of construction of agricultural facilitie. **Expected Result:** **Know:** the composition and technology of geodetic works that provide survey, design, construction, operation of structures; the main requirements for solving the most common in the construction practice of typical engineering and geodetic tasks, their a geometric entity. **Able to:** use topogeodezicheskiy material, in particular, to read a topographic map, solving on its basis the corresponding problems of both graphic and mathematical calculation character; put before the relevant geodetic and surveying services specific tasks related to the creation of a construction object, to direct these works with the indication of the requirements imposed to them based on construction tolerances; **Be competent:** on current trends in the development of geodetic instruments and methods measurements in engineering geodesy.
3	Geodesy	2	Physics, Mathematics, I,	Engineering Geology II, Basics of hydraulics	**Objective:** obtaining theoretical and practical knowledge on the complex of geodetic works performed during the survey, design, construction, operation of various types of engineering structures. **Content:** Features of engineering and geodetic works. Planned engineering-geodetic networks. Methods for calculating the accuracy of networks. Features of measuring angles and lengths of lines in engineering and geodetic networks. Physical and geographical description of the area of work. Topographic and geodetic study. Design of engineering and geodetic network and calculation of the number of stages of development. Selection of coordinate system. Triangulation network design and network accuracy assessment. **Expected Result:** **Know:** the composition and technology of geodetic works that provide survey, design, construction, operation of structures; the main requirements for solving the most common in the construction practice of typical engineering and geodetic tasks, their a geometric entity. **Able to:** use topogeodezicheskiy material, in particular, to read a topographic map, solving on its basis the corresponding problems of both graphic and mathematical calculation character; put before the relevant geodetic and surveying services specific tasks related to the creation of a construction object, to direct these works with the indication of the requirements imposed to them based on construction tolerances; **Be competent:** on current trends in the development of geodetic instruments and methods

					measurements in engineering geodesy.
4	Building structures I	1	Physics, Mathematics, I, Computer science (school course)	Building structures II, construction production Technology II	**Purpose:** getting students knowledge about the work of building structures made of concrete and reinforced concrete, stone, metal, wood and plastics in various types of stress state, as well as methods of their calculation and design. **Contents:** Introduction. Types of building structures and their applications. Construction steels. Work of steel and aluminum alloys at single static tension and compression. Work and peculiarities of metal structures elements calculation. Work of bendable elements in elastic and elastoplastic stages. Joint work of reinforcement and concrete. **Expected Result:** **Know:** the main physical and mechanical properties of materials; the main provisions of the method of calculation of building structures on the limit States. **Able to:** determine the type of stress state of structural elements; choose the most economical design solution; perform calculations and design of the main load-bearing elements; competently use the normative, instructional and technical literature. **Possess skills:** calculation and design in solving engineering problems using normative and technical literature..
4	Numerical methods in the calculation of building structures	1	Physics, Mathematics, I, Computer science (school course)	Technology of installation of metal structures, Technology of construction structures	**Objective** study of theoretical foundations of design of buildings and structures, methods of mechanics of deformable solid, numerical and probabilistic methods of calculation of building structures. **Contents:** Basic concepts of FEM; the main stages of the practical implementation of FEM; Finite elements; Construction of a finite element grid; Boundary conditions. Accuracy of results. Linear elastic element. Stiffness matrix. Core element. The stiffness matrix of the rod element. Finite element shape functions. The deformation energy of the finite element. **Expected Result:** **Know:** the main methods of calculating structures and their elements for static loads; methods of calculating reliability, numerical and analytical methods of calculation. **Able to:** freely navigate the methods of calculation; formulate and solve problems; choose the necessary methods for solving problems; process the results. **Possess skills:** about the current state of the science of reliability and safety of structures, methods of mechanics of deformable solid, numerical methods of calculation
5	Building structures II	4	Building structures I, Modern materials in construction	Technical operation of buildings, Testing, inspection and reconstruction of buildings and structures	**Purpose:** getting students knowledge about the work of building structures made of concrete and reinforced concrete, stone, metal, wood and plastics in various types of stress state, as well as methods of their calculation and design. **Content:** Pre-stressed reinforced concrete. The essence of prestressing. Significance of experimental studies in the development of the theory of reinforced concrete resistance. Elements of reinforced stone structures. Elements of reinforced stone structures. Wood structure. Physical and mechanical properties. Connections of wooden structures elements. Main types of connections.

					Expected result: **Know:** the main physical and mechanical properties of materials; the main provisions of the method of calculation of building structures on the limit States. **Able to:** determine the type of stress state of structural elements; choose the most economical design solution; perform calculations and design of the main load-bearing elements; competently use the normative, instructional and technical literature. **Possess skills:** calculation and design in solving engineering problems using normative and technical literature..
5	Construction technology	4	Numerical methods in calculations of building structures, Artificial building materials	Quality control of construction and installation works, Calculation and design of reinforcement of building structures	**Purpose:** mastering future bachelors of the theoretical foundations of construction processes, General provisions, modern methods and methods of General construction works. **Content:** Types of building structures and their applications. Construction steels. Work of steel and aluminum alloys at single static tension and compression. Work and peculiarities of metal structures elements calculation. Work and calculation of strength of centrally loaded elements. Work of bendable elements in elastic and elastoplastic stages **Expected result:** **Know:** the main provisions and tasks of construction production; technical and tariff regulation; requirements for the quality of construction products and methods of its provision, to safety; methods for selecting and documenting technological solutions at the design stage and implementation stage. **Able to**: establish the composition of work operations, construction processes and works; reasonably choose the method of execution of the construction process and the necessary technical means; the required number of workers, machines, mechanisms, materials, semi-finished products and products; issue production tasks to teams; determine the volume of work, draw up and take acts on the work performed and monitor their quality. **Possess the skills:** design process maps for General construction work; determine the composition of processes and operations of construction work; determine the complexity of construction processes and works.
6	Metrology, standardization and certification	4	Physics, Mathematics, I, II	Technical operation of buildings, Testing, inspection and reconstruction of buildings and structures	**Purpose:** study of fundamental information about Metrology, standardization and certification, principles of measurement and quality control of products.. **Contents:** General characteristics of the principles and methods of standardization. Systems of general technical standards. Organization of works on standardization. Normal inspection. Basic concepts in the field of metrology. Tools for measuring linear dimensions. Accuracy of shape and location of surfaces. The system of indicators of product quality. **Expected result:** **Know:** basic metrological rules, requirements and norms, state and regulatory acts and normative and technical documents on standardization, quality control and certification theoretical basis for the

					selection and application of various means and methods of measurement in construction. **Able to:** choose rational methods and means of measurement in construction, as well as the necessary standards for the operation of structures; find rational schemes, calculate the necessary accuracy and error of measurement; prepare the initial information and structure of new standards in the development of new products; choose the necessary means of ensuring and quality control elements in construction. **Possess skills:** use quality indicators, statistical methods of quality management in construction.
6	Standardization and certification	4	Physics, Mathematics, I, II	Quality control of construction and installation works, Calculation and design of reinforcement of building structures	**Objective:** study of fundamental information about Metrology, standardization and certification, principles of measurement and quality control of products.. **Contents:** Normative-legal and normative documents on standardization and types of standards. Standardization and quality. Organizational standardization in the Republic of Kazakhstan. The main provisions of the methodology of standards development. General requirements for the construction, presentation of design and content of standards. Standardization of industrial products. **Expected result:** **Know:** basic metrological rules, requirements and norms, state and regulatory acts and normative and technical documents on standardization, quality control and certification theoretical basis for the selection and application of various means and methods of measurement in construction. **Able to:** choose rational methods and means of measurement in construction, as well as the necessary standards for the operation of structures; find rational schemes, calculate the necessary accuracy and error of measurement; prepare the initial information and structure of new standards in the development of new products; choose the necessary means of ensuring and quality control elements in construction. **Possess skills:** use quality indicators, statistical methods of quality management in construction.
7	Soil mechanics	5	Physics, Mathematics, I, II	Strengthening of buildings, Engineering systems of buildings and structures, water Supply and sanitation	**Purpose:** training of future specialists-builders in the basics of soil mechanics and modern methods of calculation, design and construction of bases and foundations of buildings and structures in transport in various climatic and regional conditions. **Contents:** Introduction. Goals and objectives of the course. Historical review. Basic definition. The nature of the soil. Physical properties and classification indicators. Features of physical and mechanical properties of soils. The order of design of the bases and the bases. Principles of development relative settlement of the structures. Piles and pile foundations. Water-protective and constructive measures at the device of the bases. **Expected result:** **Know:** composition and structure of soils; physical and mechanical properties of soils; rheological properties of soils; **Able to:** determine the granulometric composition of soils; determine the deformation properties of soils; determine the humidity indicators of soils;

					determine the strength properties of soils. **To own skills:** methods of determining the stresses in the soil; methods for determining slope stability; methods of determining the deformation of foundations and computation of settlements of foundations; methods of evaluation of the joint work of grounds and facilities.
7	Structural mechanics	5	Physics, Mathematics, I, II	Calculation and design of reinforcement of building structures, Engineering systems, networks and equipment, Basics of hydraulics	**Purpose:** study of methods for calculating various engineering structures and structures for strength, stiffness and stability. **Contents:** Stretching-compression. Stresses, strains, displacements. Statically indeterminate tasks. The theory of the stress state. Types of stress state. Stresses on inclined planes. Experimental study of material properties. Stretching diagrams. Geometric characteristics of sections. Pure shift. Practical methods of calculation for shear and shear. **Expected result:** **Know:** methods for calculating statically definable and statically indeterminate systems, the influence of geometric and physical-mechanical parameters on the stress-strain States of structures and their elements. **Able to:** identify dangerous sections in the structure of structures, to determine the support reactions and internal forces in the sections of structures. Select the cross-section of the rolling profiles based on the conditions of strength, rigidity, stability. Calculate the value of the critical force and dynamic coefficient. **Have the skills:** to build diagrams of forces, calculate movements using the Vereshchagin rule, to assess the strength and stiffness of structures and their elements, to select structural elements from rolling profiles.
8	Building reinforcement	5	Soil mechanics, Engineering geodesy	Basics of seismology, Technology of construction of buildings and structures, Basics of computer-aided design in construction	**Purpose:** training in the basics of modern calculations, design and construction of foundations that ensure the reliability and durability of industrial and civil structures in difficult ground conditions of construction, as well as the skills of self-improvement of their knowledge and deepening practical experience in the field of geotechnical design in special conditions **Contents:** Fundamentals of modern calculations, design and construction of foundations, providing reliability and durability of industrial and civil structures in difficult ground conditions of construction, as well as skills of independent improvement of their knowledge and practical experience in the field of geotechnical design in special conditions. **Expected result:** **To know**: features of engineering and geological surveys for construction in difficult ground conditions; features of modern design of bases and foundations in difficult ground conditions; methods for improving working conditions and soil properties; **Able to:** determine the optimal types and sizes of foundations and underground structures in difficult ground conditions; choose ways to build foundations and foundations, including taking into account their artificial improvement. **Possess the skills:** analysis of complex ground

					conditions of the construction site and determination of physical and mechanical properties of soils; solution of the main tasks of designing the bases and foundations of structures on specific soils and special conditions.
8	Calculation and design of structural reinforcement	5	Geodesy, Construction mechanics	Testing of building materials and structures, seismic Resistance of buildings and structures, 3D modeling in construction	**Purpose:** formation of students ' knowledge on development trends and legislative base of electric power industry, energy resources of the Republic of Kazakhstan, ways and means of converting them into electric energy, principles of energy transmission and distribution. **Contents:** Classification of defects and damages of building structures by external signs. Methods of strengthening building structures. Strengthening of foundations. Reinforced concrete columns. Reinforcement of reinforced concrete beams (crossbars) of floors and coverings. Rein for cement of rein forced concretet russes. **Expected result:** **Know:** features of engineering and geological surveys for construction in difficult ground conditions; features of modern design of bases and foundations in difficult ground conditions; methods for improving working conditions and soil properties; **Able to:** determine the optimal types and sizes of foundations and underground structures in difficult ground conditions; choose ways to build foundations and foundations, including taking into account their artificial improvement. **Possess the skills:** analysis of complex ground conditions of the construction site and determination of physical and mechanical properties of soils; solution of the main tasks of designing the bases and foundations of structures on specific soils and special conditions.
9	Technology of construction production II	4	Building structures I, Modern materials in construction	Estimate business, Labor protection in construction, Engineering systems of buildings and structures	**Objective**: mastering future specialists of the theoretical foundations of construction processes, General principles of modern methods and methods of production of General construction works. **Content:** Basic provisions on the technology of buildings and structures erection, flow methods of construction organization, engineering preparation of the construction site, object construction master plan, material and technical support of the construction site, technology of erection of buildings from prefabricated structures, technology of erection of buildings from monolithic reinforced concrete, technology of erection of buildings from metal structures. **Expected result:** **Know:** main provisions and tasks of construction production; types of features of construction processes and works; required resources; tariff regulation; requirements for the quality of construction products; methods for its provision; safety requirements; methods and method of technology of construction processes and works, including normal and extreme conditions; methods for selecting and documenting technological solutions of the design stage and the implementation stage. **Able to:** set the composition of work operations, construction processes, reasonably choose the

					method of execution of the construction process, the necessary technical means; the required number of workers, machines, etc.mechanisms, materials, semi-finished products and products; execute production tasks teams; determine the scope of work, draw up acts on the work performed, accept the work performed and monitor the their quality. **Possess the skills of:** designing process maps for General construction work; determine.
9	Technology of installation of metal structures	4	Artificial building materials, Numerical methods in the calculation of building structures	Design and estimate business, labor Protection, Engineering systems, networks and equipment	**Purpose:** mastering future specialists of the theoretical foundations of construction processes, General principles of modern methods and methods of production of General construction works. **Contents:** Basic principles of organization of installation works. Preparation works. Preparation and acceptance of foundations. Lifting, installation and alignment of technological steel structures. Enlarged assembly and stability of installed structures. **Expected Result:** **Know:** main provisions and tasks of construction production; types of features of construction processes and works; required resources; tariff regulation; requirements for the quality of construction products; methods for its provision; safety requirements; methods and method of technology of construction processes and works, including normal and extreme conditions; methods for selecting and documenting technological solutions of the design stage and the implementation stage. **Able to:** set the composition of work operations, construction processes, reasonably choose the method of execution of the construction process, the necessary technical means; the required number of workers, machines, etc.mechanisms, materials, semi-finished products and products; execute production tasks teams; determine the scope of work, draw up acts on the work performed, accept the work performed and monitor the their quality. **Possess the skills of:** designing process maps for General construction work; determine.
10	Water supply and sanitation	4	Soil mechanics, Engineering geodesy	Estimate business, Heat and gas supply and ventilation	**Objective:** teaching students the basic issues of water supply and sanitation, the purpose and principles of the device and operation, hydraulic calculations of these systems, as well as preparing the future engineer to work independently on the design, construction and operation of these systems. **Contents:** Systems and schemes of water supply of inhabited places. Internal water supply of buildings and structures. Internal Sewerage of residential and public buildings. External sewerage networks and facilities. **Expected result:** **Know:** the main provisions of the statics and dynamics of liquid and gas, which form the basis of the calculation of hydraulic systems and engineering networks and structures; the main directions and prospects for the development of water supply and drainage systems of buildings, structures and settlements and cities, the elements of these systems, modern equipment and methods of their design, as well as the operation and reconstruction of these systems; the main physical

					and economic laws; principles and methods of calculation of systems and elements of water supply and sanitation. **Able to:** choose typical circuit solutions for water supply and sanitation of buildings, settlements and cities; perform the main types of calculations of water supply and drainage systems of internal and external networks; choose the best material based on its purpose and operating conditions. **Possess skills:** skills of engineering networks design; basics of modern methods of design and calculation of engineering equipment systems of buildings, structures, settlements and cities.
10	Basic hydraulics	4	Construction mechanics, Geodesy	Design and estimate business, Technical thermodynamics	**Objective** teaching students the basic issues of water supply and sanitation, the purpose and principles of the device and operation, hydraulic calculations of these systems, as well as preparing the future engineer to work independently on the design, construction and operation of these systems. **Contents:** Basic physical properties of liquids and gases. Basics of hydrostatics. Laws of equilibrium of liquids. Laws of motion of liquids. Hydrodynamic similarity. Local hydraulic resistances. Outflow of liquid through holes and nozzles. The flow of liquid in the pipes at different modes of motion. The pressure characteristics of the pipeline. Hydraulic shock in pipelines. One-dimensional unsteady motion, inertial head. **Expected result:** **Know:** basic laws of hydrostatics, kinematics of liquids and gases, hydrodynamics; theoretical foundations and practical methods for calculating hydraulic resistances. **Be able to:** determine hydraulic losses, loss coefficients calculated and experimentally; determine the flow rate and flow rate of the liquid. **Possess skills:** calculation of hydraulic losses in pipelines; construction of pressure characteristics of pipelines
11	Engineering systems of buildings and structures	5	Soil mechanics, construction production Technology II	Estimate business, heat and gas supply and ventilation, Technical operation of buildings	**Purporse:** acquisition by future specialists of bases of theoretical knowledge and practical skills in the field of water supply, Sewerage, gas supply, heat supply of settlements, internal device of water supply, Sewerage, gas pipeline, ventilation, heat supply of residential buildings engineering equipment of these buildings, as well as the ability to use special scientific and technical literature. **Contents:** Water supply and sewerage systems. Water supply systems of residential areas of the city and settlements. Construction heat engineering, heat and gas supply and ventilation. Water treatment facilities. The device of the water network. The energy efficiency of buildings. District heating. Heating of buildings and structures. Ventilation and air conditioning of buildings. **Expected result:** **Know:** theoretical bases of calculation and design of engineering networks, systems and equipment; principle of operation of the equipment buildings, structures of water supply, Sewerage, heat and gas supply of settlements and buildings in the environment. **Be able to:** select and design engineering systems

					for the projected building; calculate the structural elements of engineering systems and select the necessary equipment. **To possess skills:** knowledge of advanced achievements and new technologies of engineering systems design, organization of construction of networks and structures of engineering systems.
11	Engineering systems, networks and equipment	5	Construction mechanics, Technology of installation of metal structures	Design and estimate business, Technical thermodynamics, quality Control of construction and installation works	**Purpose:** acquisition by future specialists of bases of theoretical knowledge and practical skills in the field of water supply, Sewerage, gas supply, heat supply of settlements, internal device of water supply, Sewerage, gas pipeline, ventilation, heat supply of residential buildings engineering equipment of these buildings, as well as the ability to use special scientific and technical literature; **Contents:** Classification of engineering systems and their impact on the environment and human health. Engineering systems, networks and equipment. Water supply. Heat supply. Hot water supply. Water disposal. Gas supply. Ventilation. Transport and electricity. System of information. Control devices, engineering systems and networks. **Expected result:** **Know:** theoretical bases of calculation and design of engineering networks, systems and equipment; principle of operation of the equipment buildings, structures of water supply, Sewerage, heat and gas supply of settlements and buildings in the environment. **Be able to:** select and design engineering systems for the projected building; calculate the structural elements of engineering systems and select the necessary equipment. **To possess skills:** knowledge of advanced achievements and new technologies of engineering systems design, organization of construction of networks and structures of engineering systems.
12	Information technologies in construction	2	Physics, Computer science (school course)	Strengthening the building, The basics of computer-aided design in construction	**Purpose:** the skills of gathering, transmission, storage and processing of information using computers and skill with information technology and use in practice new knowledge and skills. **Contents:** Familiarity with the interface elements, types of "KOMPASS-GRAPHIC" documents. Creating, opening and saving "KOMPASS GRAPHIC" documents. Control of the image in the document window. Basic techniques. Parameter input. Geometric calculator. Use of local and global bindings. Geometric construction. Dimensioning. Marks. Object selection. Simple editing of the drawing. Complex editing. The assembly of the circuit. Setting the color scheme of the program "Compass Graph". Setting up the control Panel. Setting up the graphical editor. Configuration of settings for new documents in the program "KOMPASS-GRAPHIC". **Expected result:** **Know:** information potential of the company, information resources and services in the construction industry; main directions of information technologies; legal regulation in the information market; principles of information processing in databases. **Be able to:** use system storage, processing and transfer software products information, the shell of expert systems;

					confidently work in the program AutoCAD; to establish a search for the necessary regulatory documents in information systems and the necessary information in the global Internet. **Possess skills:** modern computer technology, computer technologies and ways to use them in professional activities.
12	Computer application in engineering calculations	2	Physics, Computer science (school course)	Calculation and construction of reinforcement of building structures, 3D modeling in construction	**Purpose:** the skills of gathering, transmission, storage and processing of information using computers and skill with information technology and use in practice new knowledge and skills. **Contents:** Classical algorithms for solving engineering problems by numerical methods, basics of working with MathCad, basics of working with MATLAB, symbolic calculations in MATLAB, solving optimization problems in MATLAB, design and modeling of control systems in MATLAB. **Expected result:** **Know:** information potential of the company, information resources and services in the construction industry; main directions of information technologies; legal regulation in the information market; principles of information processing in databases. **Be able to:** use system storage, processing and transfer software products information, the shell of expert systems; confidently work in the program AutoCAD; to establish a search for the necessary regulatory documents in information systems and the necessary information in the global Internet. **Possess skills:** modern computer technology, computer technologies and ways to use them in professional activities.
13	Fundamentals of Economics and investment activity in construction	2	Mathematics I, II, Computer science (school course)	Estimate business	**Purpose:** development of students economic thinking based on the study of the economic mechanism of the construction industry enterprises in the conditions of market economy. **Contents:** Fixed capital in construction companies. Working capital in construction companies. Industry features of the construction economy. Cost of construction products. **Expected result:** **Know:** the concept and essence of the enterprise economy, the subject and method of Economics; the constituent elements of the organizational and economic mechanism of the enterprise and the principles of their interaction; the resources of the construction industry and the methodology of their planning, justification; technical and economic indicators of the enterprise; the main economic problems and ways to improve the efficiency of **Be able to:** understand the essence of economic phenomena and processes occurring in the enterprise, their relationship and interdependence; systematize and model economic phenomena and processes, determine the impact of various factors on them; evaluate the achieved economic results of enterprises, identify reserves to improve production efficiency **Have the skills:** to assess the economic efficiency of investment in construction in modern conditions; methods of financing and crediting construction; new approaches to the issues of internal planning of construction production in order to achieve the best

					results while minimizing costs.
13	Economics and management in construction	2	Mathematics I, II, Computer science (school course)	Design and estimate business	**Purpose:** development of students economic thinking based on the study of the economic mechanism of the construction industry enterprises in the conditions of market economy. **Contents:** Enterprise as a subject of market economy. Forms of industrial relations. Forms of ownership in construction. Production funds in construction. The cost price of products of the construction organization. Profit and profitability in construction. Economic efficiency of investments in construction. **Expected result:** **Know:** the concept and essence of the enterprise economy, the subject and method of Economics; the constituent elements of the organizational and economic mechanism of the enterprise and the principles of their interaction; the resources of the construction industry and the methodology of their planning, justification; technical and economic indicators of the enterprise; the main economic problems and ways to improve the efficiency of **Be able to:** understand the essence of economic phenomena and processes occurring in the enterprise, their relationship and interdependence; systematize and model economic phenomena and processes, determine the impact of various factors on them; evaluate the achieved economic results of enterprises, identify reserves to improve production efficiency **Have the skills**: to assess the economic efficiency of investment in construction in modern conditions; methods of financing and crediting construction; new approaches to the issues of internal planning of construction production in order to achieve the best results while minimizing costs..
14	Estimate business	5	Fundamentals of Economics and investment activity in construction, Engineering systems of buildings and structures, water Supply and sanitation, technology of construction production II, technology of repair and construction works, Basics of computer-aided design in construction	Diploma design	**Purpose:** preparation of a bachelor who has not only deep theoretical training, but also has the necessary practical skills **Contents:** Estimated issues of a methodological nature. Elemental estimate standards and unit rates. Coefficients to the elementary estimated norms and unit prices. Estimated issues related to the conditions of work. Issues of rationing and remuneration. Questions of determining the cost of construction machines and mechanisms. Questions of determining the cost of construction materials. Questions of determining the cost of installation of equipment and its cost. Overhead expenses and estimated profit. Determining the cost of design work. Unexpected work and costs. **Expected result:** **Know:** the main provisions and tasks of construction production; types and features of construction work in the construction of buildings and structures; elementary estimated standards and prices, enlarged estimated standards for construction, repair and construction and installation work; estimated cost standards for winter rise in price in construction; **Be able to:** calculate the estimated cost of construction; make local and object estimates; measure volumes; accept completed work; monitor their quality **Possess skills:** in the field of estimate rationing and

					pricing in construction.
14	Design and estimate business	5	Economics and management in construction, Engineering systems, networks and equipment, Basics of hydraulics, Technology of installation of metal structures, Organization of repair and construction works and services, 3D modeling in construction	Diploma design	**Purpose:** preparation of a bachelor who has not only deep theoretical training, but also has the necessary practical skills. **Contents:** Basics of organization of construction design and estimated valuation. Fundamentals of pricing in construction. Order and rules of drawing up the estimate documentation for construction. **Expected result:** **Know:** the main provisions and tasks of construction production; types and features of construction work in the construction of buildings and structures; elementary estimated standards and prices, enlarged estimated standards for construction, repair and construction and installation work; estimated cost standards for winter rise in price in construction; **Be able to:** calculate the estimated cost of construction; make local and object estimates; measure volumes; accept completed work; monitor their quality **Possess skills:** in the field of estimate rationing and pricing in construction.
15	Heat and gas supply and ventilation	6	Engineering systems of buildings and structures, water Supply and sanitation	Diploma design	**Purpose:** The main purpose of the discipline is to acquire knowledge in the field of heating, ventilation and heat and gas supply of industrial and civil buildings. **Contents:** The basics of thermal physics. Thermal characteristics. Classification of heating systems. Basics of air exchange. Air conditioning. Gas supply. Heat supply. **Expected result:** **Know:** the main directions and prospects of development of systems of heat and gas supply, climate control, water supply and drainage, power supply of buildings, structures and settlements and cities, elements of these systems, modern equipment and methods of their design, as well as operation and reconstruction of these systems; **Be able to:** correctly choose construction materials that provide the required indicators of reliability, safety, efficiency and efficiency of structures and systems; analyze the environmental impact on the construction material and choose the best material based on its purpose and operating conditions; **Possess skills:** methods of calculation of heat networks and heat points; methods of calculation of heat exchange equipment; methods of optimal selection of equipment for heat sources and heat points.
15	Technical thermodynamics	6	Engineering systems, networks and equipment, Basics of hydraulics	Diploma design	**Purpose:** The main purpose of the discipline is to acquire knowledge in the field of heating, ventilation and heat and gas supply of industrial and civil buildings. **Content:** Ideal gas equation of state, gas constant, mixtures. Real gases, first law of thermodynamics, entropy, enthalpy, heat capacity. Thermodynamic processes of ideal gases, the second law of thermodynamics. Balance conditions of several phases of the substance. Water and water vapour, diagrammatic method and features of H-S, T-S, P-v water vapour, water vapour formulas and tables. **Expected result:** **Know:** the main directions and prospects of

					development of systems of heat and gas supply, climate control, water supply and drainage, power supply of buildings, structures and settlements and cities, elements of these systems, modern equipment and methods of their design, as well as operation and reconstruction of these systems; **Be able to:** correctly choose construction materials that provide the required indicators of reliability, safety, efficiency and efficiency of structures and systems; analyze the environmental impact on the construction material and choose the best material based on its purpose and operating conditions; **Possess skills:** methods of calculation of heat networks and heat points; methods of calculation of heat exchange equipment; methods of optimal selection of equipment for heat sources and heat points..
16	Labor protection in construction	4	Construction production technology II	Technical operation of buildings, Testing, inspection and reconstruction of buildings and structures	**Purpose:** to form students fundamental knowledge in the field of labor protection, allowing them to conduct independent work on the organization of safe and healthy working conditions at work. **Contents:** Subject, components, scientific and technical principles, meaning, terms and definitions of occupational safety. Organization of the service of control and supervision of occupational safety at the enterprise; legislative and regulatory acts on occupational safety at the enterprise; legislative and regulatory acts on occupational safety; the concept of injuries and occupational diseases. Meteorological conditions of the production environment. Production lighting, rationing, calculation. Industrial noise, vibration, human action, protection measures. Electro security. Basic information about the combustion, classification of industrial premises of explosive, equipment, fire - hazardous premises. Lightning protection of buildings and structures. The main fire-fighting measures. **Expected result:** **Know:** the main legislative acts and regulations on labor protection, methods for assessing working conditions and analyzing the causes of industrial injuries and occupational diseases, on dangerous and harmful production factors, methods and means of combating them at facilities; - technical measures: the widespread introduction of modern technology, mechanization and automation of production, the use of new technological processes; - requirements for electrical safety and fire safety; **Be able to:** evaluate and optimize working conditions, analyze the causes of accidents, predict industrial injuries and occupational diseases among employees, determine the main parameters of fire hazard substances and structures, develop and organize protective measures against dangerous and harmful factors. **Possess skills:** in matters of safety and labor protection.the help of modern means of checking and adjustment.
16	Labour protection	4	Technology of installation of metal structures	Quality control of construction and installation works,	**Purpose:** to form students fundamental knowledge in the field of labor protection, allowing them to conduct independent work on the organization of safe and healthy working conditions at work. **Contents:** Occupational health and safety organization. Instructions for employees. Types of

				Calculation and design of reinforcement of building structures	control over compliance with legislative acts on labor protection. Normative documents on labor protection. Obligations of the employee and employer to ensure safe working conditions. Occupational health and safety. Measures to prevent the effects of harmful and dangerous production factors, protection against emissions. Industrial injuries and occupational diseases. Accident at work, investigation procedure. **Expected result:** **Know: Know:** the main legislative acts and regulations on labor protection, methods for assessing working conditions and analyzing the causes of industrial injuries and occupational diseases, on dangerous and harmful production factors, methods and means of combating them at facilities; - technical measures: the widespread introduction of modern technology, mechanization and automation of production, the use of new technological processes; - requirements for electrical safety and fire safety. **Be able to:** evaluate and optimize working conditions, analyze the causes of accidents, predict industrial injuries and occupational diseases among employees, determine the main parameters of fire hazard substances and structures, develop and organize protective measures against dangerous and harmful factors. **Possess skills:** in matters of safety and labor protection.the help of modern means of checking and adjustment.
PROFILING DISCIPLINES					
Optional components (OC)					
1	Geotechnics II	3	Architecture of civil and industrial buildings and structures, Engineering geodesy	Technology of construction of buildings and structures, Technical operation of buildings	**Objective:** mastering the basics of soil mechanics by future specialists, General provisions of modern methods of design and construction of bases and foundations of buildings and structures. **Contents:** Nature of soils and their physical properties, basic preconditions and regularities of soils mechanics, definition of soils stresses and deformations, basics of the theory of the limiting stress state of soils and their applications, general principles of design of bases and foundations, foundations of shallow laying, pile foundations and foundations of deep laying, artificially improved bases, basic principles of design and construction of foundations in special conditions, features of works on the structure of bases and foundations. **Expected result:** **Know:** the main types and varieties of soils, their physical characteristics and classification indicators; basic laws of soil mechanics, characteristics of mechanical properties of soils and methods for their determination; normative methods for determining the component stress-strain state of soil bases; methods for assessing the strength, stability of soil masses and their pressure on the fence. **Be able to:** evaluate engineering and geological conditions of construction; solve typical problems of soil mechanics to determine the stress-strain state, bearing capacity and stability of soil masses and their pressure on the fence **Possess the skills:** analysis of engineering and geological conditions of the construction site and

					the choice of effective options for foundations and foundations; solving the main problems of design of foundations and foundations of buildings and structures using modern standards of geotechnical design.
1	Engineering geology II	3	Architecture, Geodesy	Seismic resistance of buildings and structures, quality Control of construction and installation works	**Objective:** mastering the basics of soil mechanics by future specialists, General provisions of modern methods of design and construction of bases and foundations of buildings and structures. **Content:** Hypotheses of the Earth's origin. Physical properties and structure of the Earth. Composition of the Earth's crust. Gravity and thermal regime of the Earth. Geospheres, their interaction. Minerals. Minerals and their rock-forming value. The concept of minerals. Genetic classification of minerals. Rocks. Classification of rocks by origin. The concept of rock masses. Geological chronology. The concept of the age of rocks. Scale of geological time. The importance of the age of rocks for construction. Magmatic rocks. **Expected result:** At the end of the course, students are formed. **Know:** the main types and varieties of soils, their physical characteristics and classification indicators; basic laws of soil mechanics, characteristics of mechanical properties of soils and methods for their determination; normative methods for determining the component stress-strain state of soil bases; methods for assessing the strength, stability of soil masses and their pressure on the fence. **Be able to:** evaluate engineering and geological conditions of construction; solve typical problems of soil mechanics to determine the stress-strain state, bearing capacity and stability of soil masses and their pressure on the fence. **Possess the skills:** analysis of engineering and geological conditions of the construction site and the choice of effective options for foundations and foundations; solving the main problems of design of foundations and foundations of buildings and structures using modern standards of geotechnical design.
2	Technology of repair and construction works	5	Modern materials in construction, Architecture of civil and industrial buildings and structures	Technology of construction of buildings and structures, Technical operation of buildings, Estimate business	**Objective:** Study of the theoretical foundations of technology and organization of work on major repairs of residential and public buildings. **Contents:** Classification and standard durations of buildings. Classification of structural elements and finishes of buildings and structures and their service life. Engineering equipment of buildings and their service life. Wear and tear of buildings and their structures. Classification and list of main repair and construction works. Technical documentation for capital repair of buildings. Organization of capital repair of buildings. Machines and mechanisms used during repair. Machines, mechanisms and equipment for loading and unloading operations. Lifting - transport and assembly machines and mechanisms. Repair and construction works. Dismantling of construction structures and engineering equipment. Requirements for materials used for soil fixing. Equipment, quality control and acceptance. Repair and reinforcement of foundations. Replacement of foundations. Expansion of the foot of foundations.

					Cementation. **Expected result:** **Know:** tasks of capital repairs of buildings in city economy, classification of repair works, the order of maintenance of repair works with material and technical resources, the organization of control over quality of the performed works, measures for ensuring safety of material values and money. **Be able to:** develop technological maps for work during major repairs of residential buildings. **To possess skills:** about the organization of design and the basis of design and estimate documentation, about structure and value of production and technical bases of repair and construction organizations.
2	Organization of repair and construction works and services	5	Artificial building materials, Architecture	Seismic resistance of buildings and structures, quality Control of construction and installation works, Design and estimate business	**Objective:** Study of the theoretical foundations of technology and organization of work on major repairs of residential and public buildings. **Content:** Incoming control. Main provisions on the technology of reconstruction of buildings and structures. Assessment of technical condition of buildings, structures and their structural elements. Design of buildings and structures reconstruction. Excavation works in cramped conditions. Construction of underground utilities in buildings and structures. Backfilling and compaction of soils in pits and trenches. **Expected result:** **Know:** tasks of capital repairs of buildings in city economy, classification of repair works, the order of maintenance of repair works with material and technical resources, the organization of control over quality of the performed works, measures for ensuring safety of material values and money. **Be able to:** develop technological maps for work during major repairs of residential buildings. **To possess skills:** about the organization of design and the basis of design and estimate documentation, about structure and value of production and technical bases of repair and construction organizations.
3	Fundamentals of computer-aided design in construction	6	Information technologies in construction, Strengthening of buildings	Testing, inspection and reconstruction of buildings and structures, Estimate business	**Objective:** is the formation of knowledge, skills and abilities of students to use the computer in the performance of design and design work and registration of relevant documentation. **Content:** Basic concepts. The concept of "sufficient capacity" of the enterprise. Designing the structure of primary production units. Organizational and technical model of industrial buildings erection. Set of works on preparation of construction. Designing the structure of the organizational system, carrying out construction. Designing the directed schedule of the complex development. Designing the construction industry. Justification of the need for resources. **Expected result:** **Know:** modern software tools for automation of graphic and design works in construction, features of automated geometric models of spatial objects, their calculations and development of drawings, modern technical tools used in CAD. **Be able to:** choose a software tool to use it in the design process, select the appropriate technical means. **Possess skills:** skills to create 2D and 3D models

					within the framework of graphic systems and perform their calculations using modern software tools.
3	3D modeling in construction	6	Application of computers in engineering calculations, Calculation and construction of reinforcement of building structures	Calculation and construction of reinforcement of building structures, Design and estimate business	**Purpose:** is the formation of knowledge, skills and abilities of students to use the computer in the performance of design and design work and registration of relevant documentation. **Contents:** Basics of work in 3 ds max. Introduction to V-Ray settings. 3ds objects max. Modeling and transformation of objects. Working with materials and textures. V-Ray textures. Light sources and cameras. V-Ray lighting. Visualization. V-Ray cameras. Programs for work with 3D models. Visualization of V-Ray. **Expected result:** **Know:** modern software tools for automation of graphic and design works in construction, features of automated geometric models of spatial objects, their calculations and development of drawings, modern technical tools used in CAD. **Be able to:** choose a software tool to use it in the design process, select the appropriate technical means. **Possess skills:** skills to create 2D and 3D models within the framework of graphic systems and perform their calculations using modern software tools.
4	Fundamentals of seismology	7	Engineering geodesy, Strengthening of buildings	Technology of construction of buildings and structures, Technical operation of buildings	**Objective:** preparation of students who possess modern knowledge about the structure of the Earth, about modern theories of its formation, about the methods currently used to obtain information about the structure and condition of the Earth. **Contents:** Deformations. Voltages. Connection of stresses and deformations. Strain energy. Equation of motion. Seismic waves. Plane wave. Inhomogeneous plane waves. Spherical wave. Wave energy. Reflection and refraction of waves at borders. Head waves. Surface wave. The simplest concentrated sources. Fundamentals of seismometry. Movement of the pendulum. **Expected result:** **Know:** the main geophysical phenomena, the limits of their applicability, the application of the laws of Geophysics in the most important practical applications. **Be able to:** navigate the maps of seismic zoning and collect seismological information to assess the seismic hazard; determine the background score of cities and towns and Refine the calculated score depending on the specific ground conditions of the site constructions. **Possess skills:** in carrying out a quantitative assessment of the strength of an earthquake by magnitude and qualitative assessment of the intensity of the manifestation of earthquakes on the surface in seismic points.
4	Testing of building materials and structures	7	Geodesy, Calculation and construction of reinforcement of building structures	Seismic resistance of buildings and structures, quality Control of construction and installation	**Objective:** mastering the basic information about the principles, methods and technical means of rational use of electricity and reducing energy losses in the power supply system of an industrial enterprise, as well as providing consumers with electric energy with standardized quality, reliability and efficiency. **Contents:** Tasks and types of tests of structures and constructions. Static tests of building structures.

				works	Methods and means of application of test force effects. Methods and devices for recording the results of static tests. Processing of static test results. Dynamic tests of buildings and structures. Methods and techniques for creating dynamic loads and impacts. **Expected result:** **Know:** the main provisions and calculation methods used in the disciplines of resistance of materials, construction mechanics and soil mechanics, which are based on the study of special courses of all building structures, machinery and equipment; General information about geodetic measurements, the basic concepts of the theory of errors, topographic maps and plans and their use in the design, reconstruction and restoration of structures. **Be able to:** solve the simplest problems of engineering geodesy; make a design scheme of the structure, make its kinematic analysis, choose the most rational method of calculation under various influences and determine the true distribution of stresses, while providing the necessary rigidity and stability of its elements taking into account the real properties of building materials, using modern computing technology. **Possess skills:** skills of calculation of elements of building structures and structures for strength, rigidity, stability; modern computer technology, computer technologies and methods of their use in professional activities; methods and means of flaw detection of building structures, control of physical and mechanical properties..
5	Technology of construction of buildings and structures	5	Strengthening of buildings, geotechnics II, technology of repair and construction works, Basics of seismology	Diploma design	**Purpose:** Training in regularities of interrelation of technological processes and selection on the basis of it of the most rational methods of performance of works on construction of objects of various functional purpose. **Contents:** Classification of construction flows. Arrangement and binding of assembly cranes (fully mobile crane and tower cranes). Definition of dangerous zones formed during operation of hoisting machines (cranes) and mechanisms. Technology of erection of residential buildings and structures. Erection of buildings by the method of floor lifting; buildings combining reinforced concrete, steel and concrete structures. Erection of buildings in large panel and block-panel formwork. **Expected result:** **Know:** modern methods of construction of buildings and structures; the main technological solutions for the construction of buildings and structures technology of construction of buildings in a dense urban development. **Be able to:** carry out construction and installation, repair and reconstruction work in accordance with the requirements of regulatory and technical documentation, contract requirements, working drawings and project work; use resource-saving technologies in the organization of construction production. **Possess skills:** on the trends of further development of construction technologies.
5	Seismic resistance of buildings and structures	5	Geodesy, Engineering	Diploma design	**Purpose:** formation of knowledge, skills and abilities in the calculation and design of structures

			Geology II, Organization of repair and construction works and services, Testing of building materials and structures		of buildings and structures erected and operated in seismic areas. **Contents:** General characteristics of earthquakes and assessment of their consequences. Estimation of earthquake intensity. Prediction of earthquakes. Character of damage to buildings during earthquakes. Calculation of buildings and structures for seismic loads. Dynamic characteristics of building materials and structures. Requirements of earthquake-resistant construction to volumetric-planning and town-planning solutions. Basic requirements for structural solutions of buildings and structures. **Expected result:** **Know:** field, objects, types and tasks of future professional activity; the main features of the chosen profession; methods of search for scientific and educational information; design forms and their design schemes, applications, methods of calculation, methods of construction of the main load-bearing structures of multi-storey buildings erected in seismic areas using stone, metal, wooden structures and reinforced concrete. **Be able to:** perform calculations to determine seismic loads, taking into account the influence of various seismological conditions on them; design individual elements, nodes and connections of elements of load-bearing structures of multi-storey buildings erected and operated in seismically active areas; make the right decisions, independently work with educational, reference and regulatory literature, improve their knowledge. **Possess the skills:** self-assessment of the construction situation and the ability to make decisions taking into account regulatory requirements, modern technologies, the latest building materials and modern methods of calculation and graphical construction.
6	Technical operation of buildings	3	Building structures II, Metrology, standardizatio n and certification, Engineering systems of buildings and structures, labor Protection in construction, geotechnics II, technology of repair and construction works, Basics of seismology	Diploma design	**Objective:** Study of operational, technical, economic, architectural and artistic requirements for buildings and structures. **Contents:** Appointment and maintenance of buildings, design and implementation of maintenance activities. Maintenance content as a system of measures aimed at ensuring operational reliability of buildings and structures. Methodology of maintenance and repair works of buildings and structures. **Expected result:** **Know:** equipment and devices used in the survey of buildings and structures; structural elements of buildings; groups of buildings capitalization, service life of building elements; instrumental methods of control of elements of operated buildings and structures; methods of assessing the technical condition of building elements and facade structures. **Be able to:** identify defects that occur in the structural elements of the building; install beacons and conduct observations of deformations; keep a log of observations; work with geodetic instruments and mechanical tools; determine the service life of building elements. **Have the skills to:** perform activities for technical operation of structures and engineering equipment

					of buildings and structures; carry out measures to assess the technical condition of structures and elements of buildings; carry out measures to assess the reconstruction of buildings and structures.
6	Quality control of construction and installation works	3	Building construction technology, Standardization and certification, Engineering systems, networks and equipment, labor Protection, Engineering Geology II, organization of repair and construction works and services, Testing of building materials and structures	Diploma design	**Purpose:** to acquaint students with the history of design, the content of design work, design methods and calculation of the main parameters, and the choice of equipment. **Contents:** The role of quality control in construction. The concept of quality of construction products. The role of quality control in construction. Regulatory framework for quality control. National documents, regulations studying the quality of products in the construction industry. System of normative documents in construction. **Expected result:** **Know:** equipment and devices used in the survey of buildings and structures; structural elements of buildings; groups of buildings capitalization, service life of building elements; instrumental methods of control of elements of operated buildings and structures; methods of assessing the technical condition of building elements and facade structures. **Be able to:** identify defects that occur in the structural elements of the building; install beacons and conduct observations of deformations; keep a log of observations; work with geodetic instruments and mechanical tools; determine the service life of building elements. **Have the skills to:** perform activities for technical operation of structures and engineering equipment of buildings and structures; carry out measures to assess the technical condition of structures and elements of buildings; carry out measures to assess the reconstruction of buildings and structures.
7	Testing, inspection and reconstruction of buildings and structures	6	Building structures II, Metrology, standardization and certification, soil Mechanics, Information technology in construction, labor Protection in construction, Basics of computer-aided design in construction	Diploma design	**Purporse:** is the training of specialists for design and production activities in the field of technical supervision and quality control of construction. **Contents:** Main provisions on the technology of reconstruction of buildings and structures. Designing the technology of reconstruction of buildings and structures. Organization of construction in the conditions of reconstruction of existing enterprises. Reconstruction of bases and foundations. Disassembly of buildings, installation and dismantling of building structures. Technology of building structures strengthening. Concrete works on reconstructed objects. Special ways of construction works. **Expected result:** **Know:** fundamentals 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 quality control of work. **Be able to:** use reference and normative literature, design and carry out technological support of construction and installation processes, perform specialized inspections of buildings and structures, field and laboratory tests of building materials, products and structures. **Possess the skills:** development of programs for

					specialized surveys of buildings and structures, drawing up statements of defects and damage to structures, solving a set of tasks for quality control of construction and installation works.
7	Calculation and design of structural reinforcement	6	Building structures II, Standardization and certification, Construction mechanics, application of computers in engineering calculations, labor Protection, 3D modeling in construction	Diploma design	**Purpose:** To use methods of effective use of resources, to provide energy-saving technology. **Contents:** General provisions. Classification of defects and damage to building structures by external signs. Methods of strengthening building structures. Methods for calculation of the strength of reinforced structures. **Expected result:** **Know:** fundamentals 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 quality control of work. **Be able to:** use reference and normative literature, design and carry out technological support of construction and installation processes, perform specialized inspections of buildings and structures, field and laboratory tests of building materials, products and structures. **Possess the skills:** development of programs for specialized surveys of buildings and structures, drawing up statements of defects and damage to structures, solving a set of tasks for quality control of construction and installation works.

LIST OF DISCIPLINES
components of choice for educational program
6B07326 "Industrial and civil construction"
Term of study: 2 years 7 month (DOT)

Group of educational programs: 6B073 Architecture and construction

№	Name of the discipline	Code of discipline	Number of credits	Semester
Basic disciplines				
1	**Component of choice 1**			
	Modern materials in construction/Artificial building materials	MMC 2211 / ABM 221	1	2
2	**Component of choice 2**			
	Architecture of civil and industrial buildings and structures/Architecture	ACIBS 2212 / Arh 2212	5	2
3	**Component of choice 3**			
	Engineering geodesy / Geodesy	EG 2213 / Geo 2213	2	2
4	**Component of choice 4**			
	Building structures I /Numerical methods in the calculation of building structures	BS I 2214 / NMCBS 2214	1	2
5	**Component of choice 5**			
	Building structures II / Construction technology	BC II 2215 / CT 2215	4	3
6	**Component of choice 6**			
	Metrology, standardization and certification / Standardization and certification	MSS 2216 / SS 2216	4	2
7	**Component of choice 7**			
	Soil mechanics / Structural mechanics	SM 3217 / SM 3217	5	2
8	**Component of choice 8**			
	Building reinforcement / Calculation and design of structural reinforcement	BR 3218 / CDSR 3218	5	3
9	**Component of choice 9**			
	Technology of construction production II / Technology of installation of metal structures	TCP II 3219 / TIMS 3219	4	3
10	**Component of choice 10**			
	Water supply and sanitation / Basic hydraulics	WSS 3219 / BH 3219	5	4
11	**Component of choice 11**			
	Engineering systems of buildings and structures / Engineering systems, networks and equipment	ESBS 3222 / ESNE 3222	5	4
12	**Component of choice 12**			
	Information technologies in construction /Computer application in engineering calculations	ITC 4223 / CAEC 4223	2	2
13	**Component of choice 13**			
	Fundamentals of Economics and investment activity in construction / Economics and management in construction	FEIAC 4224 / EMC 4224	2	2
14	**Component of choice 14**			
	Budget case/ Design and estimate business	BC 4225 / DEB 4225	5	5
15	**Component of choice 15**			
	Heat and gas supply and ventilation / Technical thermodynamics	HGSV 4226 / TT 4226	6	5
16	**Component of choice 16**			
	Labor protection in construction / Labour protection	LPC 4227 / TT 4227	4	4

Profiling disciplines				
1	**Component of choice 1**			
	Geotechnics II / Engineering geology II	Geo II 2306 / IG II 2306	3	4
2	**Component of choice 2**			
	Technology of repair and construction works /Organization of repair and construction works and services	TRSR 3307 / ORSRiU 3307	5	3
3	**Component of choice 3**			
	Fundamentals of computer-aided design in construction / 3D modeling in construction	OAPS 3308 / 3D MS 3308	6	4
4	**Component of choice 4**			
	Fundamentals of seismology / Testing of building materials and structures	OS 3309 / ISMC 3309	7	4
5	**Component of choice 5**			
	Technology of construction of buildings and structures / Seismic resistance of buildings and structures	TVZS 4310 / SZS 4310	5	5
6	**Component of choice 6**			
	Technical operation of buildings / Quality control of construction and installation works	TEZ 4311 / KKSMR 4311	3	5
7	**Component of choice 7**			
	Testing, inspection and reconstruction of buildings and structures / Calculation and design of structural reinforcement	IORZS 4312 / RCUSK 4312	6	5