

APPROVED:

Chief Engineer

«Metroproject LLP»

Utegenov N.S.

«30»

2023

APPROVED:

Director of the Institute

Transport Engineering

Chigambayev T.O.

«03»

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2023

CATALOG OF ELECTIVE COMPONENT DISCIPLINES

EDUCATIONAL PROGRAM

6B07330-Architecture of buildings and structures

Level of education: Bachelor's degree Duration of study: 4 years

Year of admission: 2023 years

Cycle	Components	Name of disciplines	Total labor		Term	learning outcomes	Short description of the discipline	Prerequisites	Post-prerequisites learning outcomes	departments
			in academic hours	in academic credits						
2	3	4	5	6	7	8	9	10	11	
ODD	KV	Ecology and life safety	150	5	3	RO6	Study of basic environmental concepts, environmental problems and approaches to their solution, sources and types of environmental pollution by enterprises, principles of regulating the quality of atmospheric air and water, the main provisions of legislation in various fields, natural and man-made emergencies, their causes, methods of prevention and protection. Teaching methods - analysis of specific situations (case-study).	Engineering mathematics, Applied physics	Resource conservation in transport, Landscape architectural design	AT SB GD
		Methods of scientific research				RO7	Students gain theoretical and applied knowledge on methods of scientific research of problems in the field under study, train specialists with cognitive skills in the field of science, form deep ideas about the content of scientific activity, its methods and forms of knowledge.	Engineering mathematics, Applied Physics	Typology of buildings and structures, Geology, soil mechanics, foundations and foundations	SGD
		Fundamentals of economics and entrepreneurship				RO5	Studies the activities of enterprises in various types of markets, the model of equilibrium and market functioning, state regulation of prices and tariffs. Considers the concept of entrepreneurship and the limits of its legal regulation, conditions for the development of entrepreneurship, organizational and legal forms of doing business, business planning, business secrecy, social responsibility of entrepreneurship. Active learning methods: case studies; business role-playing games, group work.	Engineering Mathematics	Time Management, Managerial Economics, Business Analytics Power BI	LMT
		Fundamentals of law				RO5	Improving public and individual legal awareness and legal culture of	Sociology,	Management	SGD

		and anti-corruption culture					students, as well as forming a knowledge system and a civic position on combating corruption as an anti-social phenomenon. As a result of studying the course, the student should master the fundamental concepts of law, the constitutional structure of state power of the Republic of Kazakhstan, the rights and freedoms of citizens enshrined in the Constitution, the mechanism and protection of legitimate interests of a person in case of their violation.	Cultural Studies, Political Science, Psychology	economics, Transport logistics	
DB	KV	Engineering mechanics	180	6	3	RO1	Formation of logical thinking and scientific foundation of engineering education. Study of the laws of motion and equilibrium of material bodies, construction of mathematical models of behavior of mechanical systems using theorems of mechanics. Application of methods for studying the equilibrium and motion of mechanical systems for solving technical problems. Active learning methods include the use of interactive tools, a blitz survey – a series of short questions, and performing individual calculation and graphic works.	Engineering mathematics, Applied physics	of Building structures, Light organization of the architectural environment, Technologies of light organization of space	SI
		Applied mechanics				RO1	Studies the theoretical foundations and methods of calculations for strength, rigidity, durability and stability of structural elements of transport structures, the main types of mechanisms, parts and assemblies of machines, general principles of design and construction, which is necessary for the assessment reliability of operating equipment under operating conditions. Active learning methods – performing individual calculation and graphic tasks.	Engineering mathematics, Applied physics	of Building structures, Light organization of the architectural environment, Technologies of light organization	SI
DB	KV	, Modern computer technologies in architectural practice	180	6	4	PO4, PO9	The discipline studies computer technologies in practice, the main directions of their development, CAD capabilities based on ArchiCAD and AutCAD, an overview of opportunities for engineering design and development.- construction design, layout and calculation of engineering equipment in buildings and structures, preparing the territory and working with the general plan of geoinformation systems, solving architectural problems, instills skills in creating an information environment. The discipline provides software training, computer modeling and practical analysis of results.	Information and communication technologies, Fundamentals of computer modeling,	Compositional modeling and animation in architecture and urbanplanning, Virtual computer modeling in architecture and urbanplanning, Digital diagnostics of construction objects	SI
		Fundamentals in IM-technologies in architecture				RO 9	The discipline develops skills in software products, working with BIM elements, digital modeling skills using the ArchiCAD interface, 3D-modeling, 3D-modeling, 3D-modeling, 3D-modeling, 3D-modeling, 3D-modeling, 3D-modeling, 3D-modeling, 3D-modeling, 3D-modeling, 3D-modeling, 3D-modeling, 3D-modeling, 3D-modeling, 3D-modeling, 3D-modeling, 3D-modeling, 3D-modeling, etc.elements, rules of operation of the 3D layer space, types of projections using 3D modeling tools for zoning and explication of premises, specifications, rules for working with complex geometry of 3D elements, the main directions of computer technologies in architectural design using BIM technologies. The discipline provides software training, computer modeling and practical analysis of results.	Information and communication technologies, Fundamentals of computer modeling,	Compositional modeling and animation in architecture and urbanplanning, Virtual computer modeling in architecture and urbanplanning, Digital diagnostics of construction objects	SI

DB	KV	Engineering Geodesy	180	6	5	PO4	Studies the composition and technology of geodetic works that provide surveys, design, construction, operation of structures, the main requirements for solving typical engineering and geodetic problems, their geometric essence. Gets skills in reading a topographic map, solving corresponding problems of both graphic and mathematical calculation on its basis. The discipline uses interactive teaching methods.	Engineering Mathematics, Fundamentals of Computer Modeling	Training Practice (Geodetic Engineering Networks and equipment, Engineering Systems.) Reconstruction and renovation of urban territories	SI
		Fundamentals of geoinformatics				RO4	Study of general information about geoinformation systems, basic terms and concepts, issues of data input and output, their digitization, methods of presenting spatial and attribute information, brief characteristics of the main GIS, their advantages and disadvantages, general ideas about GIS software, basic geoinformation technologies and training techniques source information, creating and editing objects. The discipline uses interactive teaching methods.	Engineering Mathematics, Fundamentals of Computer Modeling	Training Practice (Geodetic Engineering Networks and equipment, Engineering Systems.) Reconstruction and renovation of urban territories	SI
DB	KV	History of Architecture	180	6	5	RO11	The discipline aims to study historical periods and major successes of architecture, the most significant monuments and progressive achievements of regional folk architecture, architectural trends, the origin of archetypes of buildings and structures from the late period to the beginning of the XXI century, characteristic differences and progressive trends in the evolution of architecture RC for their further use in modern realities. Active learning methods are used, such as interactive and digital technologies, project-based learning methods, problem-based learning technology, and gamification.	Culturalstudies, History of Kazakhstan, Philosophy,	Typology of buildings and structures, Restoration	SI
		Architectural monuments				RO11	The discipline aims to study historical monuments, art, urban planning and architecture, which are structures, historical sites and objects related to the stages of development of the country, society, cultural and everyday features of the peoples of Kazakhstan, historical squares and centers, architectural monuments of the Republic of Kazakhstan. ensembles and complexes, architecture of religious buildings, monumental decorative and applied and other types of art. Active learning methods are used, such as interactive and digital technologies, project-based learning methods, problem-based learning technology, and gamification.	Culturalstudies, History of Kazakhstan, Philosophy,	Typology of buildings and structures, Restoration	SI
DB	KV	Fundamentals of architectural design	180	6	5	RO4	The discipline provides for the study of the basics of forming an architectural and spatial environment, taking into account the laws of architectural composition, design theory, architectural design techniques in accordance with functional, aesthetic, structural and technical, economic and other fundamental requirements, standards and legislation at all stages: from the draft design - before detailed development and evaluation of the completed project according to the project program criteria. The discipline provides software training, computer modeling and practical analysis of results.	Engineering mathematics, Fundamentals of computer modeling, Modern computer technologies in architectural practice, Fundamentals of BIM technologies in architecture	Architectural design of public buildings, Architectural design of residential buildings, Architectural design of industrial buildings and structures, Architectural design of rural settlements	SI

		Fundamentals of designing the architectural environment				RO4	The discipline considers the issues of solving drawing and graphic problems using two-dimensional graphics, typical issues of preparation of design documentation, methods of solving problems of designing construction structures by methods of three-dimensional solid-state modeling, application of computer technologies in the study of geometric and graphic problems.	Engineering mathematics, Fundamentals of computer modeling, Modern computer technologies in architectural practice, Fundamentals of BIM technologies in architecture	Architectural design of public buildings, Architectural design of residential buildings, Architectural design of industrial buildings and structures, Architectural design of rural settlements	SI
DB	KV	Compositional modeling and animation in architecture and urban	planning 180	6	6	RO4	Studies the main types of composition, properties and regularities of three-dimensional forms, the main theoretical provisions for solving compositional problems, characteristic techniques of sketch search for compositional ideas and subsequent layout, objective laws in the construction of three-dimensional forms in architectural design in order to understand the methodology of architectural creativity, which is the basis of the professional design culture of an architectural specialist. The discipline uses interactive teaching methods.	Art tools and technologies in professional activity, Painting and architectural coloristics, Fundamentals of computer modeling	Landscape architectural design, Reconstruction and renovation of urban buildings, Restoration	SI
		Virtual computer modeling in architecture and urban planning				RO4	Formation of students' knowledge and skills in the field of computer modeling of various types of processes (physical, technological, economic, etc.) using means and methods of three-dimensional visualization of digital terrain models and digital terrain models in order to use regulatory documents on quality, standardization in the practical activities of a specialist in the field of architecture and urban planning. The discipline uses interactive teaching methods.	Artistic means and technologies in professional activity, Painting and architectural coloristics, Fundamentals of computer modeling	Landscape architectural design, Reconstruction and renovation of urban buildings, Restoration	SI
DB	KV	Engineering networks and equipment	180	6	7	RO6	The discipline studies the basics of designing heating and ventilation systems, methods for calculating the installation heat capacity of heat and gas supply systems for buildings for various purposes air conditioning, principles of design and reconstruction of indoor microclimate systems to maintain the specified indoor air parameters at any time of the year, the use of equipment and technology in systems for removing harmful substances. The discipline uses interactive teaching methods, computational and analytical methods.	Engineering mathematics, Applied physics, Fundamentals of architectural design, Fundamentals of architectural environment	design Architectural design of industrial buildings and structures, Architectural design of rural settlements of rural settlements	SI
		Engineering systems				PO6	The discipline provides for the study of the values, functions of water supply and sanitation systems, installation and operation technologies, the main directions and prospects for the development of water supply systems for enterprises of various industries transport and methods of solving typical problems in the field of design and calculation of water supply systems, taking into account the latest achievements of science and technology. The discipline uses interactive teaching methods, computational and analytical methods.	Engineering mathematics, Applied Physics, Fundamentals of architectural design, Fundamentals of architectural environment	design Architectural design of industrial buildings and structures, Architectural design of rural settlements	SI
BD	KV	Light organization of the architectural environment	180	6	7	PO7	The discipline studies regulatory and methodological documents, including building codes for lighting transport highways, land and off-street pedestrian areas the main principles of organization of light and color space as an important tool in the formation of architectural and design proposals, the methodology for analyzing the lighting of	Engineering Mathematics, Applied physics, Artistic means and technologies in	Aesthetics of architecture and design, Aesthetics of design and composition in	SI

							territories of open urban and interior spaces, the algorithm of the project process in the light design of the environment. Active learning methods – performing individual calculation and graphic tasks.	professional activity	architecture, Engineering landscaping and transport, Planning of landscaping	
		Technologies of light organization of spaces				PO7	The discipline provides for the study of the idea of the light climate in the space of buildings, streets, the formation of concepts about the influence of light on compositional construction internal space, methods of architectural and design design, methods and principles of organization of light and color space, as the main means in the formation of architectural and design environment, technologies of light organization of space and possession of technical means of their design. Active learning methods – performing individual calculation and graphic tasks.	Engineering mathematics, Applied physics, Artistic means and technologies in professional activity	Aesthetics of architecture and design, Aesthetics of design and composition in architecture, Engineering landscaping and transport, Planning of landscaping	SI
PD	sq	of residential and public premises	Interior design 180	6	8	RO8, RO10	The discipline teaches the formation of professional skills in designing interiors of public and private buildings. The main goal of the project is to study the general principles and means of creating interiors , to use various methods of compositional modeling in the design process, to develop skills in conducting a comparative analysis of the interiors of architectural objects, to create the internal space of buildings using modeling methods and to harmonize the interiors of public and residential buildings. The discipline provides software training, computer modeling and practical analysis of results.	Monumental and decorative painting, Architectural drawing Compositional modeling and animation in architecture and urbanplanning, Virtual computer modeling in architecture and urban	planning Artistic design, of interior items, Interior design of premises, Aesthetics of architecture and design, Aesthetics of design and composition in architecture	SI
		Interior design of premises of buildings				RO10, RO11	The discipline studies the basics that determine the interior, requirements for the interior, nature and urban planning conditions as the basis for interior design, requirements for the interior of human psychology and physiology, interior design and equipment of the main objects of the building premises, functional and planning organization of the main room and its elements, methods of interior organization, communication with the environment, use of color, transformation of space. The discipline provides software training, computer modeling and practical analysis of results.	Monumental and decorative painting, Architectural drawing Compositional modeling and animation in architecture and urbanplanning, Virtual computer modeling in architecture and urban	planning Artistic design, of interior items, Interior design of premises, Aesthetics of architecture and design, Aesthetics of design and composition in architecture	SI
PD	KV	Artistic design of interior items	180	6	9	RO10	The discipline studies the basics of architectural and design design of interiors, sketching, interior coloristics, design in interior design with knowledge of the technology of making author's objects to order and drawing up technical specifications, determining the areas of participation and responsibility of the architect in the project implementation with the ability to correctly build the design stages, project fullness, and implement the conceived idea from the sketch to the implemented project. The discipline provides software training, computer modeling and practical analysis of results.	Interior design of residential and public premises, Interior design of buildings	Sculpture and sculptural-plastic modeling, Academic sculpture in architecture, Aesthetics of architecture and design, Aesthetics of design and composition in architecture	SI

		Interior design of premises				RO7, RO10	The discipline studies the basics that determine the interior, interior requirements, nature and urban planning conditions as the basis interior design, requirements for the interior of human psychology and physiology, interior and equipment of the main objects of the building premises, functional and planning organization of the main room and its elements, methods of interior organization, communication with the environment, use of color, transformation of space. The discipline provides software training, computer modeling and practical analysis of results.	Interior design of residential and public premises, Interior design of buildings	Sculpture and sculptural-plastic modeling, Academic sculpture in architecture, Aesthetics of architecture and design, Aesthetics of design and composition in architecture	SI
ArtD	KV	Direction Sculpture and sculptural-plastic modeling	180	6	10	PO7	The discipline studies the basics of sculptural skills, develops the ability to create artistic works independently images of the subject-spatial environment and objects of decorative and applied arts, various ways of expressing an architectural design, including plastic, graphic and mock-up images, optimal methods for depicting and creating architectural forms and spaces using methods for displaying and modeling urban planning environments and forms. Guest lectures of specialists are provided.	Interior design of residential and public spaces, Interior design of buildings, Artistic design of interior items, Interior design of premises	FINAL CERTIFICATION	SI
		Academic sculpture in architecture				RO7	Discipline gives an idea of the relationship between sculptural and architectural forms, the basics of the structure, proportional relationships of objects, the construction of basic relationships, the proportions of large volumes, their breakdown into details, the subordination of details to a large volume, their relationship, types of plastic expression and three-dimensional solutions of architectural and sculptural environment, compositional principles of the main style-forming directions using the means of monumental and decorative sculpture and architecture. The discipline provides software training, computer modeling and practical analysis of results.	Interior design of residential and public premises, Interior design of building premises, Artistic design, of interior items, Interior design of premises	FINAL CERTIFICATION	SI
PD	KV	Aesthetics of architecture and design	180	6	10	RO3, RO7	The discipline is aimed at teaching the basic concepts of aesthetics, specifics of types of architecture, features of fine, artistic art, architectural and artistic images of the twentieth century, forecasts of the twenty-first century, design features in design, artistic activities and images in the design of the monumental environment, created using methods of interpretation of empirical data in the creative process, taking into account the peculiarities of foreign and national aesthetic culture of society. Interactive teaching methods and a computational and analytical method are used.	Interior design of residential and public premises, Interior design of building premises, Artistic design, of interior items, Interior design of premises	FINAL CERTIFICATION	SI
PD	KV	Aesthetics of design and composition in architecture				PO3, PO7	The discipline provides for the study of design and composition aesthetics in the system of humanitarian knowledge, the subject of aesthetics, the system of aesthetic concepts and categories "Aesthetic" as a special form of human relations to reality, the main aesthetic categories are art - an aesthetic phenomenon of culture, features of architecture and design as aesthetic phenomena, an artistic image in architecture and design. The training methods are: problem solving, conducting thematic colloquiums, brainstorming seminars.	Interior design of residential and public spaces, Interior design of buildings, Artistic design of interior items, Design of interior items of premises	FINAL CERTIFICATION	SI
PD	KV	Engineering	180	6	10	RO6	Studies the purpose and use of city streets and roads, their	Ecology and life	FINAL	SI

		improvement of the territory and transport					engineering system and equipment including the following elements: lighting, landscaping, drainage devices, underground communications for various purposes, transport equipment, structures for transport and pedestrians (tunnels,tunnels, etc.). overpasses, pedestrian crosswalks, viaducts, aqueducts, transport interchanges, etc.), bridges and overpasses for traffic safety purposes. The discipline uses interactive teaching methods.	safety, Engineering networks and equipment, Engineering systems	CERTIFICATION	
		Territory improvement planning The					discipline studies the principles of territory improvement planning and environmental protection measures, taking into account the specifics of the infrastructure of urban territories and rural settlements, considers issues of state regulation in the field of urban and rural landscaping with the choice of effective methods for ensuring social and economic development of cultural services on the territory of the architectural complex. Active teaching methods are used, such as interactive and digital technologies, project-based teaching methods.	Ecology and life safety, Engineering networks and equipment, Engineering systems	FINAL CERTIFICATION	SI
PD	KV	Management Economics	Program 90	3	7	PO5	Formation of the conceptual framework and development of economic analysis skills using modern models and patterns of economic science, consideration of economic problems and tasks facing the head of the company. Studying this discipline will allow students to gain and develop knowledge in the field of analytical research of economic, technological and technical parameters of the enterprise, as well as to master the skills of applying special methods of economic justification of management decisions and assessing their consequences. Active learning methods are used : situational tasks and the case method.	Engineering mathematics, Fundamentals of economics and entrepreneurship	Business analytics Power BI, Engineering land improvement and transport, Planning of land improvement	SI

PD	KV	Transport logistics	90	3	8	PO5	Study of the main provisions of transport support for logistics systems, activities in the field of transportation, covering the entire range of operations and services for the delivery of goods from the manufacturer to the consumer, principles of design and construction of logistics systems. Mastering the skills of optimizing and organizing rational cargo flows, their processing in specialized logistics centers, ensuring an increase in their efficiency, reducing unproductive costs and expenses. The training methods are: problem solving, conducting thematic colloquiums, brainstorming seminars. Within the framework of the discipline, guest lectures are held by leading specialists of transport and logistics companies.	Fundamentals of economics and entrepreneurship, Fundamentals of law and anti-corruption culture	Resource saving in transport, Engineering improvement of the territory and transport, Planning of improvement of the territory	LMT
PD	KV	Resource saving in transport	90	3	9	PO5	Study of the main types and characteristics of energy resources, regulatory support for energy saving, improving the energy efficiency of the transportation process; energy-saving technologies in repair production and operation of transport infrastructure facilities organization and methods of energy saving management. It is used to solve problems, conduct thematic colloquiums, debates. Guest lectures are being held by leading experts of the transport and communication industry.	Fundamentals of economics and entrepreneurship, Fundamentals of Law and anti-corruption culture, Managerial economics	Engineering land improvement and transport, Planning of land improvement	PC
PD	KV	Time management	90	3	7	PO5	Formation of students' general ideas about the essence and types of time management, principles and methods of time resource management for more successful implementation of professional activities. Active learning methods are used: situational tasks and the case method.	Engineering mathematics, Fundamentals of economics and entrepreneurship	Business analytics Power BI, Engineering landscaping and transport, Planning of landscaping	LMT
PD	KV	Digital diagnostics of construction objects	90	3	8	RO4, RO5	Studies modern methods of diagnostics, monitoring and testing of construction objects using innovative technologies, modern geodetic means of periodic and automatic monitoring (GPS measurements, total stations, leveling, laser scanning). Active learning methods are used: situational tasks and the case method.	Engineering geodesy, Fundamentals of geoinformatics	Resource conservation in transport, Engineering landscaping and transport, Planning of territory improvement	SI
PD	KV	Business analytics Power BI	90	3	9	PO9	Formation of students' skills and knowledge to collect, analyze and structure data to build interactive dashboards, program at the current level of development of the multidimensional data analysis language MDX, build a database of data structures, create a database of data structures, models and algorithms of projects in current areas of BI technology, be able to analyze the essence of the subject field of the project and make decisions. Active learning methods are used - brainstorming, working in small groups.	Methods of scientific research, Fundamentals of economics and entrepreneurship	Engineering landscaping and transport, Planning of landscaping	IKT
Total			2760	92						

Head of the Department of "Construction Engineering"

Ismagulova S. O.