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Director of the Institute
 «Transport Engineering»
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CATALOG OF DISCIPLINES OF THE COMPONENT BY CHOICE

EDUCATIONAL PROGRAM

6B07321 – Construction of bridges, tunnels and subways

Education level: Bachelor's degree Duration of study: 4-year Year of admission: 2023

Module	Cycle	Component	Name of the discipline	Total labor		Term	intensity Semester Results of training of training	Short description	of the discipline	Prerequisites	Post require ments Depart ment
				acade mic hours	acade mic credit s						
1	2	3	4	5	6	7	8	9	10	11	12
Module 1- Natural Sciences science disciplines	GED	KV	Ecology and life safety	150	5	3	LO4	Study of basic environmental concepts, environmental problems and approaches to their solution, sources and types of environmental pollution by enterprises, principles of standardization of air and water quality, basic 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 Basics of computer modeling	Introduction to the design of transport infrastructure facilities Construction of bridges and pipes Strength of materials Engineeringmec hanics 2	ATS BGD
			Scientific Research Methods				LO3	Students obtain theoretical and applied knowledge on methods of scientific research of problems in the field of study, train specialists with skills of cognitive activity in the field of science, formulate deep ideas about the content			Engineering mathematics applied Physics Basics of computer modeling

							of scientific activity, its methods and forms of knowledge.		Structural mechanics Machinery and equipment in bridge and tunnel construction Mechanization of bridge-tunnel construction	
the SRSIFV Module 2- Withsocial and political knowledge			Fundamentals of Economics and Entrepreneurship			LO1	Formation of analytical thinking skills on economic issues, the ability to independently draw conclusions based on the material being studied, navigate in any economic situations, apply theoretical economic knowledge in practical activities, realize one's abilities, both personally and professionally.	Engineering mathematics applied Physics Basics of computer modeling	Introduction to the design of transport infrastructure facilities Construction of bridges and pipes Organization of construction of transport infrastructure facilities Organization and planning of construction of transport facilities	LMT
			Fundamentals of law and anti- corruption culture			LO1	Increasing public and individual legal awareness and legal culture of students, as well as the formation of a system of knowledge and civic position to combat corruption as an antisocial phenomenon. As a result of studying the course, students must 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 human interests in the event of their violation.	Engineering mathematics applied Physics Basics of computer modeling	Organization of construction of transport infrastructure facilities Organization and planning of construction of transport facilities Design of artificial structures in transport	SRS IFV

										Design of bridges and pipes, tunnels and metro stations	
Module 6- Basic special disciplines	BD	KV	Theoretical mechanics	180	6	3	LO3	Formation of scientific engineering thinking, familiarization with the basic concepts, laws and theorems that allow one to draw up equations that describe the behavior of mechanical systems, the ability to write down a specific phenomenon in mathematical form, the application of basic methods of mechanics in the study of the motion and equilibrium of mechanical systems in the study of disciplines of the professional cycle.	Engineering mathematics applied Physics Basics of computer modeling	Strength of materials Engineering mechanics 2 Structural mechanics Engineering mechanics 3 Tunnels Subways	SI
			Engineering mechanics 1				LO3	Formation of logical thinking and the scientific foundation of engineering education, study of the laws of motion and equilibrium of material bodies, construction of mathematical models of the behavior of mechanical systems using theorems of mechanics, use of methods for studying the equilibrium and motion of mechanical systems to solve technical problems.	Engineering mathematics applied Physics Basics of computer modeling	Structural mechanics Engineering mechanics 3 Machinery and equipment in bridge and tunnel construction Mechanization of bridge-tunnel construction	SI
	BD	EK	Strength of materials	180	6	4	LO3	Formation of fundamental knowledge in the field of calculations of structural elements for strength, rigidity and stability, development of computational and experimental fundamentals and practical methods for calculating structures subject to reliability, durability, efficiency, taking into account the mechanical properties of structural materials and the ability to design according to strength criteria, correctly assessing the limit state, to carry out verification and design calculations using modern educational and information technologies.	Engineering mathematics applied Physics Basics of computer modeling Construction Materials Theoretical mechanics The engineering geodesy	Tunnels Subways Design of bridge crossings and tunnel crossings Maintenance and repair of bridges and pipes Maintenance and repair of tunnels and subways	SI

			Engineering mechanics 2				LO3	To familiarize with the basic techniques for determining internal forces and stresses for each type of deformation, methods for calculating structures and their elements for strength, rigidity and stability, skills for studying loads, displacements and stress-strain states in structural elements, constructing design diagrams of machine parts and calculating products for meeting the requirements of reliability and efficiency under the influence of static and dynamic loads.	Engineering mathematics applied Physics Basics of computer modeling Construction Materials Theoretical mechanics The engineering geodesy	Structural mechanics Engineering mechanics 3 Tunnels Subways Design of artificial structures in transport Design of bridges and pipes, tunnels and metro stations Industrial practice 1	SI
	BD	KV	Structural mechanics	180	6	5	LO3	Studies the basic methods of calculating structural elements and structures for strength, rigidity and stability, to carry out calculations of load-bearing elements of transport structures and structures for strength, rigidity, stability and durability, taking into account the time-varying mechanical properties of the materials used, to correctly select structural forms and materials that provide the required indicators of reliability, safety and efficiency of both operated and created structures and structures.	Engineering mathematics Construction Materials Theoretical mechanics The engineering geodesy Strength of materials Introduction to the design of transport infrastructure facilities	Machinery and equipment in bridge and tunnel construction Mechanization of bridge-tunnel construction Subways Maintenance and repair of bridges and pipes Maintenance and repair of tunnels and subways	SI
			Engineering mechanics 3				LO3	Studies the theoretical foundations and methods of carrying out calculations for strength, rigidity and stability of structural elements of transport structures, the main types of mechanisms, parts and components of machines, general principles of design and construction, construction of models and algorithms for calculating products	Engineering mathematics Basics of computer modeling Construction Materials Theoretical	Subways Design of bridge crossings and tunnel crossings Maintenance and repair of	SI

								according to the main performance criteria when assessing the reliability of existing equipment in conditions operation.	mechanics Strength of materials Engineeringmechanics 2	bridges and pipes Maintenance and repair of tunnels and subways Industrialpractice 2	
Module 7- Engineering 1	BD	KV	The engineering geodesy	180	6	3	LO5	Forms professional competencies that determine the bachelor's readiness and ability to use basic knowledge in the field of geodesy, allows for geodetic measurements related to solving typical construction problems, detailed breakdown of structures, control of the geometric shapes of the structure being built, and perform as-built surveys of the results of individual stages of construction and installation work , provides skills in using basic geodetic instruments for specific production conditions.	Engineering mathematics applied Physics Basics of computer modeling	Tunnels Subways Design of bridge crossings and tunnel crossings Design of artificial structures in transport Design of bridges and pipes, tunnels and metro stations	SI
			Basics of geoinformatics				LO5	Studies the history of the development of geographic information systems (GIS), basic concepts and terms, general issues of geoinformatics, application technologies in subject areas of professional activity, the current state of technical, software and information support of GIS, forms an understanding of the features of creating a GIS, hardware and software, and applications GIS for use in business, management, science and technology.	Engineering mathematics applied Physics Basics of computer modeling	Tunnels Subways Design of bridge crossings and tunnel crossings Design of artificial structures in transport Design of bridges and pipes, tunnels and metro stations	SI
	BD	KV	Basics of designing transport structures	180	6	4	LO7	Forms knowledge and skills in using automated design tools for artificial structures using the AutoCAD software package, designing communication routes, basic elements of highways, basic elements of airfields and airports, bridges and traffic interchanges,	Engineering mathematics applied Physics Basics of computer modeling	Structural mechanics Engineering mechanics 3 Machinery and equipment in	SI

Module 7- Engineering 1								teaches how to work in text editors and spreadsheet editors in order to implement rational principles of design of transport structures.		bridge and tunnel construction Mechanization of bridge-tunnel construction	
			Introduction to the design of transport infrastructure facilities				LO7	Forms professional competencies in the field of state regulation of the organization and management of transport complexes, optimization of technological processes and design of transport infrastructure facilities, deepening knowledge about the road transport and railway complex as a set of industries not only directly performing transportation, but also assessing elements of transport infrastructure from the standpoint of safety and efficiency, make a reasonable choice of roads according to classification when developing the network to organize efficient and safe transportation.	Engineering mathematics applied Physics Basics of computer modeling Construction Materials Theoretical mechanics The engineering geodesy	Tunnels Subways Design of bridge crossings and tunnel crossings Maintenance and repair of bridges and pipes Maintenance and repair of tunnels and subways	SI
	BD	KV	Machinery and equipment in bridge and tunnel construction	180	6	5	LO9, 10,11	It studies the scope of application, control systems, design features and technical characteristics of a wide range of modern specialized construction machines and equipment, examines the technologies of general construction processes carried out during the construction of bridges and tunnels using specialized construction machines and small-scale mechanization equipment in order to train specialists for construction and design organizations transport construction industry.	applied Physics Basics of computer modeling Construction Materials Theoretical mechanics The engineering geodesy Strength of materials Engineering mechanics 2 Introduction to the design of transport infrastructure facilities	Subways Design of bridge crossings and tunnel crossings Maintenance and repair of bridges and pipes Maintenance and repair of tunnels and subways Design of artificial structures in transport Design of bridges and pipes, tunnels	SI

										and metro stations Industrial practice 2	
Module 7- Engineering 1			Mechanization of bridge-tunnel construction				LO9, 10,11	It studies the purpose, design, area of rational use of construction machines in the construction of bridges and tunnels, modern methods of designing complex mechanization of road construction works, allows one to master the skills of organizing technological processes of production and operation of ground transport-technological machines and complexes for the purpose of determining the optimal degree of mechanization and mechanical equipment production processes in the construction complex.	Engineering mathematics applied Physics Basics of computer modeling Strength of materials Engineering mechanics 2 Introduction to the design of transport infrastructure facilities	Design of bridge crossings and tunnel crossings Maintenance and repair of tunnels and subways Industrial practice 2 Design of artificial structures in transport Design of bridges and pipes, tunnels and metro stations	SI
Module 8- Engineering 2	PD	KV	Bridge-tunnel construction technology	180	6	6	LO10 ,11	Forms theoretical and practical knowledge on the installation of bridge superstructures using longitudinal sliding, mounted and semi-mounted assembly methods, the production of earthworks using scrapers, bulldozers, graders, single-bucket and multi-bucket excavators, the construction of tunnels using mining and panel methods, drilling and blasting operations, technologies for the production of earthen, concrete, reinforced concrete and installation works for the purpose of improving bridge-tunnel construction technologies.	Basics of computer modeling Construction Materials Theoretical mechanics The engineering geodesy Strength of materials Introduction to the design of transport infrastructure facilities	Organization of construction of transport infrastructure facilities Organization and planning of construction of transport facilities Design of bridges and pipes, tunnels and metro stations	SI
			Technology of construction of bridges, tunnels and subways				LO10 ,11	Describes methods for installing reinforced concrete and metal bridges, methods for constructing supports and foundations of overpasses, technologies for manufacturing	Basics of computer modeling Construction Materials	Design of bridge crossings and tunnel crossings	SI

								elements of prefabricated reinforced concrete bridge structures and steel bridge superstructures, methods for constructing transport tunnels, stage and station tunnels and metro stations using complex mechanization and robotization of mining operations to improve technologies for the construction of transport structures.	Theoretical mechanics The engineering geodesy Strength of materials Engineering mechanics 2 Introduction to the design of transport infrastructure facilities	Maintenance and repair of bridges and pipes Organization of construction of transport infrastructure facilities Organization and planning of construction of transport facilities	
Module 8- Engineering 2	PD	KV	Organization of construction of transport infrastructure facilities	180	6	7	LO10 ,11	Describes, models and plans the organization of construction of transport infrastructure facilities, technological processes of work, management of material and technical support of enterprises and organizations, uses methods and methods for forming sets of machines for the construction of transport facilities, organizes activities for the design of product manufacturing processes, the use of automation tools and systems for the purpose of managing the construction cycle of a transport infrastructure facility.	Construction Materials Theoretical mechanics The engineering geodesy Strength of materials Engineering mechanics 2 Introduction to the design of transport infrastructure facilities	Maintenance and repair of tunnels and subways Industrial practice 2 Design of artificial structures in transport Design of bridges and pipes, tunnels and metro stations	SI
			Organization and planning of construction of transport facilities				LO10 ,11	Formulates and classifies the principles of organizing and planning the construction of transport facilities, content, structure, types and varieties of technological processes, organizational and technical preparation of the construction site, organization of factory production of reinforced concrete, steel and composite structures, methods and means of integrated mechanization of production, models of calendar plans and network schedules for selecting options for organizational and technological solutions for the construction of	Basics of computer modeling Construction Materials Theoretical mechanics The engineering geodesy Strength of materials Engineering mechanics 2	Maintenance and repair of tunnels and subways Industrial practice 2 Design of artificial structures in transport Design of bridges and	SI

								transport structures.	Introduction to the design of transport infrastructure facilities	pipes, tunnels and metro stations	
Module 8 Engineering 2	PD	KV	Design of artificial structures in transport	180	6	8	LO2	Forms practical skills in the use of modern methods and methods of design and the fundamentals of mathematical modeling of artificial structures in transport, taking into account static and dynamic loads, natural and man-made influences, complex engineering-geological and hydrological conditions, allowing to identify the most rational parameters of elements of load-bearing structures to ensure the required degree of stability , durability, reliability and cost-effectiveness of the structure.	Engineering mathematics Basics of computer modeling Construction Materials The engineering geodesy Strength of materials Introduction to the design of transport infrastructure facilities	Industrialpractice 2 FINAL EXAMINATION	SI
			Design of bridges and pipes, tunnels and metro stations				LO2	Teaches the skills of designing and calculating road and railway bridges and pipes, haul tunnels and metro stations, taking into account complex engineering-geological and hydrological conditions, seismic and man-made impacts, designing diagrams of bridge crossings, tunnel and station complexes in order to implement the most effective design solutions for bridges, pipes, internal arrangements of tunnel and station complexes.	Basics of computer modeling Construction Materials The engineering geodesy Strength of materials Introduction to the design of transport infrastructure facilities	Industrialpractice 2 FINAL EXAMINATION	SI

Module 9- Resource management	PD	KV	Managerial economics	90	3	5	RO6	Formation of the conceptual framework and development of economic analysis skills using modern models and patterns of economic activity 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.	Engineering mathematics, Fundamentals of economics and entrepreneurship	Organization of construction of transport infrastructure facilities, Organization and planning of construction of transport structures,Moderniz ation of railway lines, Reconstruction of railways	LMT
Module 5 IT competencies	PD	KV	Time management	90	3	5	PO6	Formation of students ' general ideas about the essence and types of time management, principles and methods of management a temporary resource for more successful implementation of professional activities.	Sociology, CulturalStudies, Psychology,Phylosophy , Engineering mathematics.	Organization of construction of transport infrastructure facilities, Organization and planning of construction of transport structures, Modernization of railway lines, Reconstruction of railways	LMT
Module 9- Resource management	PD	KV	Transport logistics	90	3	6	PO6	Study of the main provisions of transport support of 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 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,	Fundamentals of economics and entrepreneurship,чнов ы new computer modeling	Organization of construction of transport infrastructure facilities, Organization and planning of construction of transport Modernization of railway lines, Reconstruction of railways	LMT

								conducting thematic colloquiums, brainstorming seminars. The discipline includes guest lectures by leading experts of transport and logistics companies			
Module 5-IT competencies	PD	KV	Digital diagnostics of transport structures	90	3	6	RO6	Study of digital technologies of transport structures information processing systems, basic functional units, principles of information division and multiplexing, analysis of characteristics of digital communication channels in diagnostics of transport construction objects	Information and communication technologies, Engineering mathematics, Applied physics, Fundamentals of computer modeling	Organization of construction of transport infrastructure objects, Organization and planning of transport construction Modernization of railway lines, Reconstruction of railways	SI
Module 9- Resource management	PD	KV	Resource saving in transport	90	3	7	PO6	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 held by leading experts of the transport and communication industry	Ecology and life safety, Methods of scientific research, Fundamentals of law and anti-corruption policy. culture, Fundamentals of economics and entrepreneurship	Modernization of railway lines, Reconstruction of railways	PS
Module 5-IT competencies			Business analytics Power BI	90	3	7	PO6	Teaches the skills of creating interactive visualizations of data obtained from various sources and providing them to employees of this organization, obtaining valuable information when making strategic decisions, analyzing retrospective and current results. data analysis, presentation of results in intuitive visual formats providing general access to business-critical analytical data using Power BI	Information and communication technologies, Fundamentals of Economics and Entrepreneurship, Engineering Mathematics, Fundamentals of Computer Modeling	Railway line modernization, Railway Reconstruction	ICT
	Total			2580	86						

Head of the Department of "Construction Engineering"

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