AGREED
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«25»____02_____2025 y.

CATALOG OF UNIVERSITY COMPONENT DISCIPLINES

EDUCATIONAL PROGRAMS 6B07348 – CONSTRUCTION OF HIGHWAYS AND AIRFIELDS

Education level: Bachelor's degree **Duration of study: 3 yers** **Year of admission: 2025 y.**

Цикл	Компонент	Наименование дисциплины	Общая трудоемкость		Семестр	Результаты обучения	Краткое описание дисциплины	Пререквизиты	Постреквизиты
			в академических часах	в академических кредитах					
2	3	4	5	6	7	8	9	10	11
BD	UC	Engineering Mathematics 1	150	5	1	PO1	The discipline "Engineering Mathematics 1" studies the basic concepts of higher mathematics and its applications. The course sections include elements of linear algebra and analytical geometry, an introduction to mathematical analysis, and differential calculus of functions of one and several variables. The purpose of the course is to master the mathematical apparatus for solving theoretical and applied problems of a specific profile, to gain an understanding of mathematical modeling, and to develop analytical and systems thinking, which makes it possible to effectively solve engineering problems. The discipline uses interactive teaching methods and performing computational and graphical work.	Mathematics Physics	Engineering Mathematics 2 Applied mechanics
BD	UC	Engineering Mathematics 2	150	5	1	PO1	The formation of students' mathematical knowledge and skills necessary for the study of related natural science disciplines, disciplines of the professional cycle and skills of mathematical modeling and research in professional activities. The course sections include integral calculus of functions of one and several variables, ordinary differential equations, and series theory. Special attention is paid to the application of mathematical methods to solve engineering problems.	Engineering Mathematics 1	Construction chemicals Building materials Engineering geodesy

BD	UC	Building Physics	150	5	1	PO4	Formation of knowledge, skills and competencies necessary for the development, design and operation of energy-efficient, comfortable and durable buildings and structures. Studies the physical processes and phenomena occurring in building structures and buildings, as well as their interaction with the environment, the basics of building and architectural acoustics, building climatology, lighting engineering, thermal engineering.	Engineering Mathematics 1	Strength of materials Construction mechanics Building structures
BD	UC	Construction chemicals	120	4	2	PO3	The formation of knowledge in the field of building chemistry is associated with the development of science and technology aimed at improving building materials and their application processes. Construction chemistry studies and develops chemical materials, additives and substances that affect the properties of building structures, ensuring their strength, durability, resistance to external influences and energy efficiency. An important part of the course is studying the environmental impact of building chemicals.	Engineering Mathematics 1 Building Physics	Construction mechanics Applied mechanics Building structures
PD	UC	Engineering geodesy	180	6	3	PO3	Forms professional competencies that determine the readiness and ability of the bachelor to use basic knowledge in the field of geodesy, allows you to make geodetic measurements related to the solution of typical construction tasks, a detailed layout of structures, to control the geometric shapes of the erected structure, perform executive surveying results of individual stages of construction and installation work, gives skills for the application of basic geodetic instruments for specific production conditions.	Engineering Mathematics 1 Engineering Mathematics 2 Building Physics Construction chemicals	Mechanics of structural strength Applied mechanics Foundations and bases
BD	UC	Building materials	180	6	2	PO1 PO8	Apply modern building materials, demonstrate the main indicators of quality, modern methods of production of building materials for the transport industry, the main laws and dependence on the physical and mechanical properties, production technology and conditions of formation, methods of finishing, mastering technological processes of construction production, production of building materials, products and structures on the artificial structures under construction.	Engineering Mathematics 1 Building Physics	Surveys and design of highways Reconstruction of highways Technology of construction of highways and airfields 1 Highways and airfields
BD	UC	Building structures	120	4	4	PO2 PO7	The discipline studies the design, analysis and application of various types of structures such as buildings, bridges and transport structures. It covers materials, mechanical properties and strength calculation methods. Knowledge in this area is necessary to create safe and sustainable facilities that meet modern standards and requirements.	Engineering Mathematics 1 Engineering Mathematics 2 Building Physics Construction chemicals Engineering geodesy Building materials	Foundations and bases Surveys and design of highways Technology of construction of highways and airfields 1 Technology of construction of highways and airfields 2
BD	UC	Occupational safety and health	150	5	8	PO8	The discipline studies the direction of students' formation of knowledge and skills necessary to ensure safe working and living conditions. The legal and organizational foundations of occupational safety, methods of occupational risk assessment and management, means of individual and collective protection, emergency prevention, as well as measures to prevent injuries and occupational diseases are studied. Special attention is paid to the creation of a safe	Engineering Mathematics 1 Engineering Mathematics 2 Building Physics Construction chemicals	Road conditions and traffic safety Quality control of road assets

							working environment, compliance with labor protection standards and requirements, as well as the formation of a safety culture in professional activities.	Engineering geodesy Building materials Building structures	
BD	UC	Engineering graphics and computer modeling	120	4	1	PO4	The course covers the principles of technical drawing and engineering graphics, as well as modern 3D modeling methods using specialized software, aimed at developing skills in designing and visualizing technical objects, creating digital models and diagrams, drafting, modeling structures, and analyzing their parameters for solving engineering problems.	Engineering Mathematics 1 Engineering Mathematics 2	Resistance of materials Construction mechanics Hydrotechnical calculations and measurements Engineering equipment of highways
BD	UC	Python pogramming basics	90	3	2	PO4	The discipline studies the syntax and semantics of the Python language, algorithmization and program design, program structuring and solving problems related to artificial intelligence, learns machine learning, data processing and intelligent system development methods, and analyzes the use of AI in various fields, forming professional competencies in programming and the basics of artificial intelligence.	Engineering Mathematics 1 Engineering Mathematics 2	Geoinformation systems in geology Hydrotechnical calculations and measurements Automated highway design systems
BD	UC	Professionally oriented foreign language	90	3	6	PO9	Formation and development of professional communicative competence in a foreign language necessary for professional activity, proficiency in a professional foreign language for written and oral information exchange, development of skills in reading and understanding professional literature on their specialty in a foreign language, development of the ability to express their thoughts orally and in writing in situations of professional and business communication.	Building materials Building structures Engineering geodesy Foreign language	Operation of highways and airfields Quality control of road construction works
PD	UC	Fundamentals of highway design	150	5	4	PO5 PO7	The program of the course "Fundamentals of Road Design" is aimed at studying the laws of interaction between a car and a road, the main elements of roads, the principles of choosing the direction of the route, designing longitudinal and transverse profiles, hydraulic calculations of artificial structures, designing and calculating road pavements, designing intersections and junctions from the standpoint of ensuring road safety.	Engineering Mathematics 1 Engineering Mathematics 2 Building Physics Construction chemicals	Surveys and design of highways Reconstruction of highways Technology of construction of highways and airfields 1 Technology of construction of highways and airfields 2 Operation of highways and airfields
PD	UC	Surveys and design of highways	150	5	5	PO5, PO7	The discipline "Road Surveys and Design" covers a wide range of issues in the field of engineering and geodetic, geological, economic and environmental surveys necessary to justify the choice of the direction of the highway route. In the course of the discipline, the laws of interaction between the car and the road, the main elements of roads, from the standpoint of ensuring road safety, the principles of laying the road route on the ground, designing longitudinal and transverse profiles, hydraulic calculations of artificial structures, designing and calculating road pavements, designing intersections and junctions are studied.	Engineering Mathematics 1 Engineering Mathematics 2 Building Physics Construction chemicals Engineering geodesy Resistance of materials Fundamentals of	Highways and airfields Engineering equipment of highways

								highway design Engineering graphics and computer modeling	
PD	UC	Reconstruction of highways	150	5	6	PO6 PO9	The formation of skills and knowledge necessary for the preparation of projects for the reconstruction of highways, which contributes to the improvement of transport infrastructure and improve road safety and comfort. Examines the reasons why roads require reconstruction, including wear, damage, methods of engineering assessment of the condition of existing roads and their elements in order to determine the level of wear and reconstruction requirements.	Engineering Mathematics 1 Engineering Mathematics 2 Building Physics Construction chemicals Engineering geodesy Resistance of materials Fundamentals of highway design Engineering graphics and computer modeling	Highways and airfields Engineering equipment of highways Operation of highways and airfields Road conditions and traffic safet
PD	UC	Technology of construction of highways and airfields 1	150	5	5	PO8 PO9	The purpose of the discipline is to develop knowledge and skills in the field of technological processes in the construction of highways and airfields. The discipline program includes the study of processes at the stages of preparation, installation of bases and coatings, selection of materials, organization and control of construction work, taking into account technical requirements and climatic conditions.	Engineering Mathematics 1 Engineering Mathematics 2 Building Physics Construction chemicals Engineering geodesy Resistance of materials Fundamentals of highway design Engineering graphics and computer modeling	Technology of construction of highways and airfields 2 Operation of highways and airfields Road conditions and traffic safet
PD	UC	Technology of construction of highways and airfields 2	150	5	6	PO8 PO9	The purpose of the discipline is to master the full process of highway and airfield construction technology, taking into account the work of manufacturing enterprises in the road industry. The course program examines the production processes of road construction materials, the organization of construction work, interaction with industry enterprises, as well as the effective use of machinery and resources in road construction.	Engineering Mathematics 1 Engineering Mathematics 2 Building Physics Construction chemicals Engineering geodesy Resistance of materials Fundamentals of highway design Engineering graphics and computer modeling Technology of construction of	Highways and airfields Engineering equipment of highways Operation of highways and airfields Road conditions and traffic safet

								highways and airfields 1	
PD	UC	Highways and airfields	150	5	7	PO6 PO7	Formation of skills in research, design of highways in difficult natural conditions, technical and economic assessment of variants of its elements, which allows choosing the most optimal solutions for given specific conditions, assigning the necessary measures and making competent engineering decisions in difficult conditions of designing a highway to ensure the strength and stability of the roadbed, pavement and other road structures.	Engineering Mathematics 1 Engineering Mathematics 2 Building Physics Construction chemicals Engineering geodesy Resistance of materials Fundamentals of highway design Engineering graphics and computer modeling Technology of construction of highways and airfields 1 Technology of construction of highways and airfields 2	Operation of highways and airfields Road conditions and traffic safet
PD	UC	Engineering equipment of highways	150	5	7	PO5 PO9	The purpose of the training course "Engineering equipment of highways" is to generate knowledge about technical means of traffic management that ensure safety, comfort and convenience for all participants in the traffic flow. As part of the course, students learn basic engineering equipment such as lighting, signs, barriers, traffic control systems, road markings and traffic lights in populated areas. Important attention is paid to modern technologies and innovations at the stage of development of design and estimate documentation, as well as environmental and sustainable development issues. Mastering this discipline allows future specialists to effectively solve problems related to the design and operation of roads, ensuring high standards of quality and safety of transport infrastructure.	Engineering Mathematics 1 Engineering Mathematics 2 Building Physics Construction chemicals Engineering geodesy Resistance of materials Fundamentals of highway design Engineering graphics and computer modeling Technology of construction of highways and airfields 1 Technology of construction of highways and airfields 2	Operation of highways and airfields Road conditions and traffic safet

PD	UC	Operation of highways and airfields	180	6	8	PO6 PO9	The purpose of the discipline is to develop skills in the field of operation of highways and airfields, taking into account the road infrastructure. Modern repair and maintenance technologies, monitoring systems, diagnostics of the condition of highway elements, organization of work to ensure traffic safety, as well as the effective use of technical and information resources are being studied.	Engineering Mathematics 1 Engineering Mathematics 2 Building Physics Construction chemicals Engineering geodesy Resistance of materials Fundamentals of highway design Engineering graphics and computer modeling Technology of construction of highways and airfields 1 Technology of construction of highways and airfields 2 Engineering equipment of highways	Road conditions and traffic safet
PD	UC	Road conditions and traffic safety	150	5	9	PO6 PO7	The purpose of the discipline is to prepare students to assess road conditions and develop measures to ensure traffic safety. The course is aimed at mastering the methods of analyzing the traffic situation, identifying potential hazards on the roads and developing solutions to improve safety for both drivers, pedestrians and cyclists.	Engineering Mathematics 1 Engineering Mathematics 2 Building Physics Construction chemicals Engineering geodesy Resistance of materials Fundamentals of highway design Engineering graphics and computer modeling Technology of construction of highways and airfields 1 Technology of construction of highways and airfields 2 Engineering equipment of highways Operation of highways and airfields	Quality control of road assets Estimated pricing in architecture and construction
			2880	**96**					