

## CATALOG OF ELECTIVE DISCIPLINES

**6B07 - Engineering, manufacturing and construction industries**  
(Code and classification of the field of education)

**6B073 - Architecture and construction**  
(Code and classification of the direction of training)

**0730**  
(Code in the International Standard Classification of Education)

**B074 - Urban planning, construction works and civil engineering**  
(Code and classification of the educational program group)

**6B07302 - Civil Engineering**  
(Code and name of the educational program)

**bachelor**  
(Level of preparation)

**set of 2024**

**Developed**

By the Academic Committee of the EP  
The head of the AC D.Kozhakhmetova  
EP Manager I.Zhumadilov

**Reviewed**

at a meeting of the Commission on Academic Quality of the Faculty of Engineering and Technology  
Protocol №3 of January 15, 2024  
at a meeting of the Commission on Academic Quality of the Higher School of Artificial Intelligence and  
Construction  
Recommended for approval by the University Academic Council  
Protocol №1 of June 6, 2024

**Approved**

at a meeting of the University Academic Council by protocol No. 3 of January 16, 2024.  
at a meeting of the University Academic Council by protocol No. 6 of June 18, 2024.

## Autocad in pojecting

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

### Short description of discipline

*The discipline is devoted to the study of AutoCAD program, mastering the interface of AutoCAD, tools for mastering 2D modeling: drawing, editing, forming image formats, the formation of orthogonal projections of parts with a section, the formation of images of diagrams by means of AutoCAD. 3D modeling in AutoCAD: the basic elements of 3D modeling, building 3 D models, building orthogonal projections. Construction of 2D and 3D objects in AutoCAD.*

### Purpose of studying of the discipline

*The study of the basic principles of computer-aided design fundamentals of drawing in AutoCAD*

### Learning Outcomes

*ON 5 Design and calculate building structures .*

### Learning outcomes by discipline

*The expected results of training in the discipline "AutoCAD in design" include the formation of students` skills in working with AutoCAD software to create, edit and analyze project documentation. Students will master the basic functions and tools of the program, which will allow them to effectively develop drawings and diagrams, as well as visualize design solutions. In addition, attention will be paid to the development of critical thinking and the ability to analyze, which contributes to the high-quality execution of project tasks and to improving the level of professional training in the field of design.*

- 1) choose suitable methods and means of solving engineering and geodetic problems using AutoCAD;*
- 2) create projects in AutoCAD and work with them;*
- 3) import data into AutoCAD and create digital terrain models and route plans based on them;*
- 4) calculate the volume of earthworks by various methods and perform other 3D modeling work.*
- 5) apply AutoCAD software in solving tasks of automated 2D and 3D design.*

### Prerequisites

*Introduction to construction*

### Postrequisites

*The architecture Architecture of industrial buildings*

## Computer drawing in design

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

### Short description of discipline

*The discipline is devoted to the study and practical development of computer technology in graphics application packages, develops spatial imagination of students. In addition, the study of State Standards Unified system of design documentation, the basic principles and rules of design documentation. Students study ways of graphic representations, fulfillment of sketches of details, drawing up of design and technical documentation creation of volume models with the help of AutoCAD computer program.*

### Purpose of studying of the discipline

*The purpose of teaching the discipline "Computer drawing in design" is computer engineering training: for students of builders. The tasks include providing the student with a minimum of fundamental engineering and geometric knowledge and knowledge in the field of drawing and modeling.*

### Learning Outcomes

*ON 5 Design and calculate building structures .*

### Learning outcomes by discipline

*The expected results of training in the discipline "Engineering Mechanics" include the acquisition of knowledge and skills for the analysis and calculation of various mechanical systems, which is critical for understanding the stability and reliability of building structures. Students will study the principles of statics, dynamics and resistance of materials, learn how to calculate loads, deformations and stresses in structural elements, which will allow them to develop sustainable and safe construction projects. This knowledge will provide the basis for further study of more specialized engineering disciplines and practical application in design.*

- 1) Distinguish methods for depicting spatial forms on a plane;*
- 2) explore the geometric properties of various objects using given images;*
- 3) demonstrate computer design skills in the AutoCad graphics program*

### Prerequisites

*Introduction to construction*

### Postrequisites

*The architecture*

## Computer graphics in construction

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

### Short description of discipline

*The discipline is devoted to the study and practical development of methods for the development of text and drawing. Design documentation using modern graphic editors, as well as the development of students` ability to spatial imagination. In the course students study the application of computer technology in the system AutoCAD in the construction of graphic models: drawings, objects*

in construction. Construction of drawing elements: walls, window blocks, doors, sizing, symbols.

### **Purpose of studying of the discipline**

The purpose of teaching the discipline "Computer graphics in construction": preparing students for independent, creative work, performing which they must demonstrate basic knowledge when working with the computer-aided design program AutoCAD.

### **Learning Outcomes**

ON 5 Design and calculate building structures .

### **Learning outcomes by discipline**

The expected results of training in the discipline "Computer Graphics in construction" include the development of students` skills to work with modern graphics programs and tools used in architecture and construction. Students will learn how to create and edit graphic materials such as drawings, diagrams and three-dimensional models, as well as apply computer technology to visualize design solutions. The course provides an understanding of the basics of computer graphics, including vector and raster graphics, which allows students to effectively present their ideas and projects. As a result, students will be able to successfully integrate graphic solutions into their professional activities, which will increase their competitiveness in the labor market.

1) Apply standards, GOST standards, Unified system of design documentation.

2) know the basic principles of computer-aided design systems; three-dimensional surfaces and bodies; the basics of building drawings in the system

### **Prerequisites**

Introduction to construction

### **Postrequisites**

The architecture

## **Water supply and sewerage**

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

### **Short description of discipline**

The content of the discipline is aimed at achieving the main objectives of water supply and sewerage. The purpose of the discipline is to form students with the necessary knowledge of the fundamentals of the properties of liquids, the laws of hydrostatics, hydrodynamics, to ensure the supply of water to consumers, as well as the removal of domestic wastewater, the correct solution of engineering problems of water supply and sanitation of residential buildings.

### **Purpose of studying of the discipline**

The purpose of the discipline "Water supply and sanitation" is to form students with the necessary knowledge of the basics of the properties of liquids, the laws of hydrostatics, hydrodynamics, to ensure the supply of water to consumers, as well as the removal of domestic and surface wastewater, the correct solution of engineering problems of water supply and sanitation of residential buildings.

### **Learning Outcomes**

ON 4 Calculate engineering systems and machines in civil engineering.

### **Learning outcomes by discipline**

The expected results of training in the discipline "Water supply and sewerage" are the formation of students` knowledge about the design, operation and modernization of water supply and sewerage systems in urban and rural conditions. Students will get acquainted with modern technologies of water purification and distribution, as well as methods of wastewater management and their safe discharge. The course involves the study of norms and standards governing the design of these systems, as well as an assessment of the environmental consequences of their operation. As a result of the training, students will be able to effectively analyze and develop projects that ensure high-quality water supply and proper wastewater management, as well as apply innovative solutions to improve the reliability and sustainability of water supply and sewerage systems.

Calculates engineering systems and machines in civil engineering

The main problems of water supply and sanitation, buildings, facilities and settlements

Design indoor and outdoor water supply and sanitation systems

### **Prerequisites**

Physics

### **Postrequisites**

Technology of production construction

## **Geodetic works in the construction of structures**

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

### **Short description of discipline**

The discipline is aimed at studying road transport structures, surveys and breakdown of roads, bridge crossings, pipelines. As well as the removal of planning and building projects in kind. The study of geodetic support of urban construction, geodetic works in the construction of industrial, hydraulic structures. During the construction of pits, the task of geodetic works is the breakdown of the contour of the pit from the main axes of the structure fixed on the rag, high-altitude control of excavation, executive survey of the pit.

### **Purpose of studying of the discipline**

The purpose of the discipline is to train specialists who have the necessary theoretical knowledge and practical skills of conducting geodetic works, which would allow them to master and implement all the progressive achievements of training and modern geodetic technologies in the future of their professional activities.

### **Learning Outcomes**

ON 6 Analyze geo research and design foundations.

## Learning outcomes by discipline

The expected results of studying in the discipline "Geodetic works during the construction of structures" are that students will acquire the necessary knowledge and skills in the field of geodetic measurements and spatial analysis methods that are used in construction and land management. The course covers the theoretical foundations of geodesy, including the study of the geometry of the earth, coordinate systems, as well as methods of leveling, theodolite measurements and GPS technologies. Students will learn how to conduct topographic surveys, analyze and process the data obtained, as well as use specialized software to create geodetic maps and terrain models.

1 to form the ability to solve problems related to the breakdown of geometric elements of designed structures and objects on the ground

2 develop skills of working with regulatory, instructional and project documents

3 to study the methods of production of geodetic measurements on the earth's surface and in mine workings

### Prerequisites

Introduction to construction

### Postrequisites

Technology of production construction

## Geodesy

Discipline cycle Basic disciplines

Course 2

Credits count 5

Knowledge control form Examination

### Short description of discipline

The purpose of this discipline is to form a general idea of the means and methods of geodetic works in topographic and geodetic surveys, the use of ready-made planning and cartographic materials in operational exploration, mining and processing of minerals, construction and operation of industrial and civil facilities, as well as mining enterprises, in the production and technological sphere and design and survey organizations, organizational, managerial and research activities.

### Purpose of studying of the discipline

The purpose of the discipline "Geodesy" is to master the basic information about geodetic measurements performed on the Earth's surface, their

mathematical processing, methods of drawing up maps and plans and vertical profiles, training in the implementation of planned and high-altitude ground

geodetic surveys, the product of mathematical processing of the results of field measurements, the solution of individual engineering tasks necessary for the

construction of buildings and structures.

### Learning Outcomes

ON 6 Analyze geo research and design foundations.

### Learning outcomes by discipline

The expected results of studying in the discipline "Geodesy" are that students will acquire the necessary knowledge and skills in the field of geodetic measurements and spatial analysis methods that are used in construction and land management. The course covers the theoretical foundations of geodesy, including the study of the geometry of the earth, coordinate systems, as well as methods of leveling, theodolite measurements and GPS technologies. Students will learn how to conduct topographic surveys, analyze and process the data obtained, as well as use specialized software to create geodetic maps and terrain models.

1 perform various types of geodetic works on the construction site

2 to draw up projects of geodetic works and engineering and geodetic surveys

3 solve technical problems in the design and engineering-geodetic surveys

### Prerequisites

Introduction to construction

### Postrequisites

Technology of production construction

## Geotechnics

Discipline cycle Basic disciplines

Course 2

Credits count 5

Knowledge control form Examination

### Short description of discipline

Geotechnics is a relatively new concept, which currently covers such sciences as soil mechanics, on which the foundation construction is based. The purpose of mastering the discipline "Geotechnics" is to acquaint the student with methods for determining physical and mechanical properties, with methods for analyzing the earth mass as the basis or environment for the location of engineering structures, depending on natural pressure and external load

### Purpose of studying of the discipline

The objectives of mastering the discipline The objectives of mastering the discipline "Fundamentals of Geotechnics" are- initial acquaintance of the student with the methods of determining the physical and mechanical properties of soils in massifs, methods of calculating the stress-strain state of the soil mass depending on natural pressure and external load, analysis of the soil mass as a base or environment for placing engineering structures, familiarization with the methods of designing foundations according to limit states.

### Learning Outcomes

ON 6 Analyze geo research and design foundations.

### Learning outcomes by discipline

The expected results of training in the discipline "Geotechnics" include the formation of students' knowledge about the properties of soils, their behavior under load and the influence of geological factors on the design and construction of facilities. The course covers topics related to soil research, foundation calculations and the stability of structures, as well as methods of strengthening and improving

soils. Students will master the principles of geotechnical design, study methods of laboratory and field testing of soils, and will also be able to use modern software systems for the analysis and modeling of geotechnical conditions. As a result of the training, they will be ready to conduct geotechnical surveys, assess the stability and safety of building structures, as well as develop recommendations for their design and strengthening.

1 Analyzes geo research and designs foundations

2 Evaluate engineering and geological conditions of construction

3 Anticipate and prevent various exogenous and gravitational processes

#### **Prerequisites**

Construction materials

#### **Postrequisites**

Foundations and bases

## **Engineering geology and soil mechanics**

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

#### **Short description of discipline**

The purpose of the discipline is to form the necessary knowledge among specialists in the complex study of natural and man-made conditions of construction objects, making forecasts of the interaction of these objects with the environment, their engineering protection and justification of safe living conditions of the population. The purpose of the discipline is to gain in-depth knowledge of soil mechanics, to develop skills in the application of numerical computational methods in soil mechanics.

#### **Purpose of studying of the discipline**

The purpose of the discipline is the formation of knowledge and practical skills necessary for specialists in the integrated study of natural and man-made conditions of the territory of construction projects, forecasting the interaction of these objects with the environment, the rationale for their engineering protection and safe living conditions

#### **Learning Outcomes**

ON 6 Analyze geo research and design foundations.

#### **Learning outcomes by discipline**

The expected results of training in the discipline "Engineering Geology and soil Mechanics" are aimed at forming students' in-depth knowledge of geological processes, soil properties and their behavior under construction loads. The course covers topics related to the study of geological conditions, the analysis of mechanical properties of soils and methods of their classification. Students will learn how to conduct geological surveys, assess the stability and deformation characteristics of soils, as well as apply knowledge to the design of foundations and foundation-forming structures.

1 Formation of skills for determining the physical and mechanical properties of soils

2 Knowledge of the necessary engineering and geological surveys for specific construction sites, providing a reliable assessment of the soils of the bases

3 Mastering the physical and mechanical properties of soils and theoretical laws of soil mechanics

#### **Prerequisites**

Construction materials

#### **Postrequisites**

Foundations and bases

## **Engineering systems of buildings and structure**

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

#### **Short description of discipline**

The discipline is aimed at studying the history of the development of heating and ventilation technology, as well as thermal and air modes of buildings. Design and operation of heating systems. The discipline is aimed at the acquisition by future specialists of theoretical knowledge and practical skills in the field of water supply, sewerage, gas supply, heat supply of settlements, internal construction of water supply, sewerage, gas pipeline, ventilation, heat supply of residential buildings.

#### **Purpose of studying of the discipline**

The discipline "Engineering systems of buildings and structures" aims to acquire future specialists the basics of theoretical knowledge and practical skills in the field of water supply, sewerage, gas supply, heat supply of populated areas, the internal structure of water supply, sewerage, gas pipeline, ventilation, heat supply of residential buildings.

#### **Learning Outcomes**

ON 4 Calculate engineering systems and machines in civil engineering.

#### **Learning outcomes by discipline**

The expected results of training in the discipline "Engineering systems of buildings and structures" imply the formation of students' in-depth knowledge about the principles of design, operation and maintenance of engineering systems such as heating, ventilation, air conditioning, electricity and water supply. Students will be able to analyze various engineering solutions, choose the best technologies and systems to ensure comfortable conditions in buildings. The course also focuses on the integration of modern technologies and automation into engineering systems, which allows students to develop skills in systems thinking and critical analysis. As a result, students will gain practical knowledge and skills necessary for successful work in the field of design and management of engineering systems of buildings and structures.

1 To evaluate the quality of the work performed

2 Calculates engineering systems and machines in civil engineering

3 Theoretical bases of calculation of engineering networks, systems, equipment, principles of operation of equipment of buildings, structures, settlements in environmental protection conditions

## Prerequisites

Physics

## Postrequisites

Technology of production construction

## Fundamentals of soil mechanics

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

### Short description of discipline

*The purpose of studying the discipline is to acquire in-depth knowledge about soil mechanics, experimental and theoretical prerequisites, features of soil deformation, basic calculation models, special types of soils, rheological foundations of soil mechanics, dynamic properties of soils, the development of skills in applying numerical calculation methods in soil mechanics. The discipline helps students to study the properties of soils in the construction of buildings and structures.*

### Purpose of studying of the discipline

*The purpose of the discipline is to acquire in-depth knowledge about soil mechanics, experimental and theoretical prerequisites, features of soil deformation, basic calculation models, special types of soils, rheological foundations of soil mechanics, dynamic properties of soils, development of skills in applying numerical calculation methods in soil mechanics.*

### Learning Outcomes

*ON 6 Analyze geo research and design foundations.*

### Learning outcomes by discipline

*The expected results of training in the discipline "Fundamentals of soil mechanics" are aimed at forming students' fundamental knowledge about the physical and mechanical properties of soils, as well as about the behavior of soils under load. During the course, students will learn basic concepts such as the classification of soils, their plasticity, compressibility and strength. They will also master laboratory and field testing methods used to determine soil characteristics. In addition, students will learn how to apply theoretical knowledge to analyze the stability of structures, calculate foundations and foundations, which will allow them to make informed engineering decisions in the design and construction process. As a result, they will be prepared for the practical application of soil mechanics in various construction projects.*

*1 Perform engineering calculations of weak soils, calculations taking into account the rheological properties of soils, calculations of dynamic impacts in soils*

*2 Analyzes geo research and designs foundations*

*3 Knowledge of the necessary engineering and geological surveys for specific construction sites, providing a reliable assessment of the soils of the bases*

### Prerequisites

Construction materials

### Postrequisites

Technology of production construction

## Systems of coordinates and altitudes in geodesy

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

### Short description of discipline

*The discipline studies the performance of high-precision measurements using global navigation satellite systems (GNSS) GLONASS and GPS are closely related to coordinate systems in which satellite measurements are performed. The discipline is part of space geodesy, where geocentric rectangular spatial coordinate systems are mainly used to determine the coordinates of points on the earth's surface, and spherical coordinate systems are used to describe the movement of satellites.*

### Purpose of studying of the discipline

*The purpose of the discipline "Coordinate systems and heights in geodesy" is to master the basic information about geodetic measurements performed on the Earth's surface.*

### Learning Outcomes

*ON 6 Analyze geo research and design foundations.*

### Learning outcomes by discipline

*The expected results of training in the discipline "Coordinate systems and heights in geodesy" are the formation of students' in-depth knowledge of the principles and methods of determining coordinates and heights in various geodetic systems. During the training, students will master the basic concepts and categories of coordinate systems, their classification and application in the practice of geodesy. They will also learn how to use modern tools and technologies for measurements and calculations, including GPS methods and leveling. As a result, students will be able to apply their knowledge to solve practical problems in geodetic surveys, design and construction, which will allow them to work confidently in the field of cadastral and topographic works.*

*1 to make and draw topographic plans of the area*

*2 to perform primary mathematical processing of measurement results and assessment of their accuracy*

*3 create a survey justification and perform topographic surveys*

### Prerequisites

Introduction to construction

### Postrequisites

Technology of production construction

## Heating and ventilation systems

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline is aimed at studying the hygienic and physical foundations of heating and ventilation, hydraulic calculation of the heating system. Aerodynamic calculations of air balance and ventilation systems, air treatment. The discipline aims to ensure thermal comfort – the study of the optimal temperature regime favorable for the life and activity of people in the cold season, the state of the air environment, humidity, pressure, composition and purity of air in public and industrial buildings

### Purpose of studying of the discipline

The discipline "Heating and ventilation systems" aims to provide thermal comfort – an optimal temperature environment favorable for people's life and activity in the cold season, the study of the state of the air environment – humidity, temperature, mobility, pressure, composition and purity of air in residential, public and industrial buildings.

### Learning Outcomes

ON 4 Calculate engineering systems and machines in civil engineering.

### Learning outcomes by discipline

The expected results of training in the discipline "Heating and ventilation" include the acquisition by students of knowledge about the design, operation and maintenance of heating and ventilation systems in buildings of various types. Students study the basic principles of thermal engineering, methods for calculating thermal loads and heat distribution schemes, as well as modern ventilation and air conditioning technologies. The course also covers energy efficiency, the use of renewable energy sources and climate control automation systems. As a result of the training, students will be able to develop projects that ensure an optimal microclimate, health and comfort of users, as well as compliance with norms and standards in the field of heating and ventilation.

1 Design indoor and outdoor water supply and sanitation systems

2 Calculates engineering systems and machines in civil engineering

3 Master hydraulic and aerodynamic calculations of heating and ventilation systems

### Prerequisites

Physics

### Postrequisites

Technology of production construction

## Hydraulics and hydraulic machines

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline studies hydrostatics, fundamentals of kinematics, basic equations of motion of gases and liquids. Studies the modes of motion, the basics of hydrodynamic similarity, hydraulic resistances, as well as fluid leakage from holes, also studies the laws of fluid at rest and motion, data on hydraulic jumping and coupling of water courses, weirs, mating and waterworks, descriptions and designs of pumps, methods for calculating the main parameters.

### Purpose of studying of the discipline

The purpose of studying the discipline "Hydraulics and hydraulic machines" is to form students' systematic engineering knowledge on the laws of hydrostatics and fluid and gas hydrodynamics, to determine the basic properties of liquids and gases used in aviation technology, the principles of operation of hydrodynamic machines and mechanisms used on civil aviation aircraft.

### Learning Outcomes

ON 4 Calculate engineering systems and machines in civil engineering.

### Learning outcomes by discipline

The expected results of training in the discipline "Hydraulics and hydraulic machines" include the formation of students' in-depth knowledge of the principles of hydraulic systems and mechanisms. Students should be able to analyze and design hydraulic circuits, select suitable machines for various technological processes, and calculate their parameters. In addition, they will learn how to diagnose and maintain hydraulic installations, which will ensure the efficient and safe use of hydraulic equipment in construction and other industries.

1 Skills of creative generalization of the acquired knowledge, concrete and objective presentation of their knowledge in written and oral form

2 Calculates engineering systems and machines in civil engineering

3 To use the acquired knowledge in the bachelor's work on the operation of vehicles in production

### Prerequisites

Technology of production construction

### Postrequisites

Technology of construction of buildings and structures

## Hydromechanics and water resources

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline "Hydromechanics and Water Resources" studies the laws of fluid motion and their impact on engineering structures. Students deepen their knowledge in the field of hydrodynamics, calculation of water flows, as well as analysis of water resources. The



course includes the study of problems of management and protection of water bodies, as well as the development of engineering solutions for the sustainable use of water resources

### **Purpose of studying of the discipline**

The purpose of studying the discipline "Hydromechanics and water Resources" is to form students' deep knowledge of the physical principles underlying the behavior of water systems. The course is aimed at mastering the methods of analysis and modeling of water flows, which is necessary for the design of efficient water infrastructures. Students are also trained in the assessment and management of water resources, taking into account environmental, economic and social aspects. An important task is to develop the skills to apply the acquired knowledge in practice to solve real problems in the field of hydraulics and water supply.

### **Learning Outcomes**

ON 5 Design and calculate building structures .

ON 6 Analyze geo research and design foundations.

### **Learning outcomes by discipline**

The expected learning outcomes of the discipline "Hydromechanics and Water Resources" are the ability of students to apply the basic principles of hydrostatics and hydrodynamics to solve practical problems related to water resources. Students should be able to analyze various hydraulic systems and design elements of hydraulic structures taking into account modern standards. It is also important that they can assess the environmental impact of water management and develop sustainable solutions for water management. As a result of the training, students will gain skills in working with modern tools and technologies necessary for effective management of water resources.

The results of the teacher's training in the discipline "Hydromechanics and water resources" include the formation of students' deep understanding of the physical and mathematical foundations of hydraulics and hydromechanics. The teacher should be able to inspire students to apply theoretical knowledge to practical tasks related to water resources management and the design of hydraulic structures. An important result is also the development of critical thinking skills and an analytical approach to solving environmental and engineering problems in the field of water management

### **Prerequisites**

Construction structures

### **Postrequisites**

The construction of special buildings and structures

## **Hydraulic Engineering**

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

### **Short description of discipline**

The discipline «Hydraulic Engineering» studies the basics of design, construction and operation of hydraulic structures for the regulation and management of water resources. During the course, students will learn about hydrodynamics, hydraulic calculations, hydraulic structures, as well as safety principles when working with water bodies, which prepares them for professional activities in the field of hydraulic engineering.

### **Purpose of studying of the discipline**

The purpose of the discipline "Hydraulic Engineering" is to teach students the basics of designing and operating hydraulic structures that ensure the management and protection of water resources. The course is aimed at developing skills in analyzing hydrodynamic processes and making engineering decisions for the effective use and conservation of water resources.

### **Learning Outcomes**

ON 5 Design and calculate building structures .

ON 6 Analyze geo research and design foundations.

### **Learning outcomes by discipline**

The expected results of training in the discipline "Hydraulic engineering" suggest that students will master the basic principles of designing and operating hydraulic structures. They must learn how to analyze hydraulic processes, model flows, and assess environmental impacts. In addition, students will be able to develop projects for water supply, sanitation and water management systems, taking into account modern technologies and regulatory requirements. As a result, the training will provide training for specialists who are able to effectively solve problems in the field of hydraulic engineering.

Based on the results of training in the discipline "Hydraulic Engineering", students will be able to analyze and calculate hydraulic processes, as well as design and evaluate the reliability of hydraulic structures. They will master the skills of using engineering methods to ensure the stability and safety of water bodies in various operating conditions.

### **Prerequisites**

Construction structures

### **Postrequisites**

The construction of special buildings and structures

## **Engineering geodesy**

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

### **Short description of discipline**

The discipline "Engineering Geodesy" studies planned and high-altitude engineering and geodetic networks, topographic and geodetic surveys, geodetic center work, geodetic support of installation work, control of deformations of structures, geodetic work in transport construction, geodetic work on industrial sites, the use of space and computer technologies. The purpose of mastering the discipline is to form students' knowledge, skills and abilities in the field of engineering geodesy

### **Purpose of studying of the discipline**

The purpose of mastering the discipline "Engineering Geodesy" is to form students` knowledge, skills and abilities in the field of engineering geodesy: - improvement of measurement techniques that ensure obtaining results with a given and reasonable accuracy; - research and improvement of devices, as well as the organization and methods of performing measurements in various natural conditions.

### **Learning Outcomes**

ON 6 Analyze geo research and design foundations.

### **Learning outcomes by discipline**

The expected results of training in the discipline "Engineering Geodesy" include the development of students` skills in geodetic measurements and topographic surveying, as well as the development of methods for processing and analyzing geodetic data. Students should be able to apply modern geodetic tools and technologies to solve design and construction problems. In addition, they will learn how to evaluate the accuracy of measurements and their impact on design decisions, which is key to ensuring the quality of engineering work.

1 Analyzes geo research and designs foundations

2 Improvement of measurement techniques that ensure obtaining results with a given and reasonable accuracy

3 Geodetic support of the construction process of buildings and structures at all stages of its stages

### **Prerequisites**

Geotechnics

### **Postrequisites**

Technology of construction of buildings and structures

## **Engineering landscaping**

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

### **Short description of discipline**

Students should be competent in the organization of transport and pedestrian traffic in the improvement of urban areas, engineering improvement of sports complexes and recreation areas. The purpose of mastering the discipline is the theoretical development of the basic methods of organizing the design of sites related to the engineering preparation of the territory and the solution of transport problems in the planning projects of residential buildings and partially municipalities.

### **Purpose of studying of the discipline**

The purpose of mastering the discipline "Engineering landscaping of territories" is the theoretical development of the main methods and methods of organizing the design of sections related to the solution of engineering preparation of the territory and transport tasks in the planning projects of residential territories and, partially, municipalities.

### **Learning Outcomes**

ON 6 Analyze geo research and design foundations.

### **Learning outcomes by discipline**

The expected results of training in the discipline "Engineering Geodesy" include the development of students` skills in geodetic measurements and topographic surveying, as well as the development of methods for processing and analyzing geodetic data. Students should be able to apply modern geodetic tools and technologies to solve design and construction problems. In addition, they will learn how to evaluate the accuracy of measurements and their impact on design decisions, which is key to ensuring the quality of engineering work.

1 Know the requirements of engineering preparation of the territory for construction purposes

2 Be able to draw up vertical planning schemes when new conditions arise that interfere with the normal operation of the territory

3 Possess the skills of designing the main recreational areas of settlements

### **Prerequisites**

Geotechnics

### **Postrequisites**

Technology of construction of buildings and structures

## **Design of Hydraulic structures**

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

### **Short description of discipline**

The discipline "Design of hydraulic structures" introduces students to the principles and methods of designing hydraulic structures. Technologies for calculating and creating reservoirs, dams, canals and other engineering systems. Students also study the application of modern engineering and hydrodynamic methods in the design and construction of hydraulic structures, the features of modern technologies for the construction of such structures.

### **Purpose of studying of the discipline**

The purpose of studying the discipline "Design of hydraulic structures" is to form students` comprehensive knowledge and skills in the field of designing water infrastructures. Students study the basic hydraulic principles, methods of calculation and design of various hydraulic engineering facilities. Attention is also focused on ensuring the safety, functionality and sustainability of structures in a changing climate. An important aspect is the study of environmental requirements and the impact of projected facilities on the environment.

### **Learning Outcomes**

ON 5 Design and calculate building structures .

ON 6 Analyze geo research and design foundations.

### **Learning outcomes by discipline**

The expected results of the training in the discipline "Design of hydraulic structures" include the development of students` skills in the analysis and design of various hydraulic engineering facilities, such as dams, canals and pumping stations. Students should be able to apply hydraulic calculations to optimize design solutions and take environmental aspects into account when designing. It is expected that graduates will confidently navigate the regulatory documentation and modern software tools used in hydraulic engineering design. In addition, they must demonstrate the ability to work in a team and effectively interact with other specialists in the project development process.

The results of the training in the discipline "Design of hydraulic structures" for the teacher include the formation of students` deep understanding of the principles of designing hydraulic structures and their impact on the environment. The teacher must ensure that students master the methods of analysis, calculation and design, as well as relevant technologies and software solutions in this area. An important aspect is the development of critical thinking skills and the ability to innovate in design, which will allow graduates to successfully solve practical problems. The teacher should also focus on the relevance of an interdisciplinary approach and cooperation with other specialists in the design of hydraulic structures.

#### **Prerequisites**

Construction structures

#### **Postrequisites**

The construction of special buildings and structures

## **The Sanitary equipment of buildings**

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

#### **Short description of discipline**

The discipline is aimed at studying the engineering support of buildings and individual objects for various purposes, sewers and drains of buildings and objects. The discipline studies theoretical and practical recommendations for solving engineering problems.

The purpose of studying the discipline is to train specialists in the field of design and operation of sanitary and technical systems, cold and hot water supply systems, as well as drainage systems of buildings for various purposes

#### **Purpose of studying of the discipline**

The purpose of studying the discipline "Sanitary and technical equipment of buildings" is to train specialists in the field of design and operation of sanitary and technical systems, cold and hot water supply systems, as well as drainage systems of buildings for various purposes.

#### **Learning Outcomes**

ON 4 Calculate engineering systems and machines in civil engineering.

#### **Learning outcomes by discipline**

- 1 To study the issues of improving and introducing new methods of designing water supply and sanitation systems of buildings
- 2 To use the acquired knowledge in the bachelor`s work on the operation of vehicles in production
- 3 Calculates engineering systems and machines in civil engineering

#### **Prerequisites**

Technology of production construction

#### **Postrequisites**

Technology of construction of buildings and structures

## **Construction machines and equipment**

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

#### **Short description of discipline**

The content of the discipline is aimed at studying the classification of construction machinery, transport, transporting, loading and unloading and lifting machines, machines and equipment for earth and pile work. Изучаются мМинк machines for crushing, sorting and washing stone materials are being studied. Machines and equipment for preparation, transportation of concrete and mortars and compaction of concrete mixtures. Machines for finishing works. Basics of construction machinery operation

#### **Purpose of studying of the discipline**

The purpose of mastering the discipline "Construction machinery and equipment" is to form knowledge, skills and abilities in the field of application of construction machinery and construction equipment in the construction of residential and industrial buildings.

#### **Learning Outcomes**

ON 4 Calculate engineering systems and machines in civil engineering.

#### **Learning outcomes by discipline**

The expected results of training in the discipline "Construction machinery and equipment" include the formation of students` in-depth knowledge about the types, principles of operation and technical characteristics of construction equipment. Students should be able to effectively select and apply appropriate equipment for various construction processes, ensuring the optimization of productivity and safety of work. They will also learn how to diagnose, maintain and repair machines, which will ensure the reliability and long service life of equipment on construction sites.

- 1 Calculates engineering systems and machines in civil engineering
- 2 To use the knowledge gained during the study of the discipline on the choice of machinery and equipment when performing construction work on construction sites
- 3 Independently use special literature devoted to the field of application of construction machinery and construction equipment in the construction of residential and industrial buildings

#### **Prerequisites**

Technology of production construction

## Postrequisites

Technology of construction of buildings and structures

## Foundations and bases

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline studies the basic concepts of foundations and foundations, their types and classification. The main components. Deposition of bases. Deformation of foundations. The calculation of the foundation precipitation, the depth of the foundation, the main and additional loads, the method of calculating foundations are studied.

Students study basic information about the types of modern foundations and foundations, methods of calculation and design, methods of strengthening the foundations and foundations of buildings and structures.

### Purpose of studying of the discipline

Students study basic information about the types of modern foundations and foundations, methods of calculation and design, methods of strengthening the foundations of buildings and structures

### Learning Outcomes

ON 6 Analyze geo research and design foundations.

### Learning outcomes by discipline

The expected results of training in the discipline "Foundations and foundations" include the formation of students` in-depth knowledge of the principles of design, calculation and construction of foundations. Students should be able to analyze the soil conditions and choose the most appropriate types of foundations, depending on the specifics of the facility under construction. In addition, they will learn how to assess the stability and durability of foundations, as well as apply modern diagnostic and repair methods to ensure the reliability of building structures.

1 Analyzes geo research and designs foundations

2 To determine the stresses in the soil mass and the deformation of the base under the influence of external loads

3 Assess the stability of soils at the base of structures and slopes, as well as pressure on enclosing structures

### Prerequisites

Geotechnics

### Postrequisites

Technology of construction of buildings and structures

## BIM-technology in building design

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline "BIM-technology in building design" studies the use of special architectural software to perform the necessary elements in the design of standard architectural exhibits, the use of special functions to create walls, windows and specific building requirements for construction in residential/ commercial and industrial architecture. The discipline allows you to master the knowledge of the concept and terminology of BIM technology, get acquainted with the advantages and disadvantages, methods of implementation

### Purpose of studying of the discipline

The purpose of the discipline: To provide information about a new design method (Building Informational Modeling) - the process that results in the formation of an information model of a building.

### Learning Outcomes

ON 5 Design and calculate building structures .

ON 7 Design energy efficient and information modeling of buildings.

### Learning outcomes by discipline

1 Designs energy efficient and information modeling of buildings

2 BIM allows you to transfer a virtual information model from the development team to the general contractor and owners.

3 Allows you to implement the calculation of estimates, "5D Estimates" and others

### Prerequisites

Autocad in pojecting

### Postrequisites

Final examination

## Smart technologies in construction

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline "Smart Technology in Construction" is a basic discipline that delivers students information about current technologies in the design of engineering networks, and even more thoroughly explore the global construction industry, detect errors and shortcomings by comparing and analyzing, which in the end allow to make a choice of a rational option, using a computer model of the building and structure

### Purpose of studying of the discipline

The purpose of mastering the discipline "Smart technologies in construction" is to prepare the future student for independent work on the development of new technologies by optimizing technological modes.

### **Learning Outcomes**

ON 5 Design and calculate building structures .

ON 7 Design energy efficient and information modeling of buildings.

### **Learning outcomes by discipline**

Designs energy-efficient and information modeling of buildings

### **Prerequisites**

Autocad in pojecting

### **Postrequisites**

Final examination

## **Organization of project documentation**

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

### **Short description of discipline**

The discipline "Organization of project documentation" is basic and forms students` theoretical knowledge in the field of organization of project activities of enterprises, in the field of methodological approaches to project evaluation and practical skills in the field of working with project management standards, creating regulations for project activities, planning, management and control of projects, as well as analyzing the effectiveness of projects.

### **Purpose of studying of the discipline**

The purpose of the discipline "Organization of project activities" is to provide students with competencies in the field of organizing creative and production activities of designers and project teams.

### **Learning Outcomes**

ON 5 Design and calculate building structures .

### **Learning outcomes by discipline**

1 Demonstrates knowledge in the organization of project documentation

2 Distinguishes between types of project documents and applies them for their intended purpose

3 Uses the necessary standards and regulations in the project business

### **Prerequisites**

Bases of economics, law and ecological knowledge

### **Postrequisites**

Final examination

## **Software packages for computer-aided design**

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

### **Short description of discipline**

The study of the discipline will become familiar with the basic principles of CAD, methods of classification of design processes and design work, to form knowledge, skills, automation process design and design documentation in the design of buildings and structures using modern software systems. To achieve the goal is given a review of the structure and principles of computer-aided design, provides an overview of the components and software tools CAD.

### **Purpose of studying of the discipline**

The main purpose of the discipline "Software systems for computer-aided design" is to familiarize students with the fundamental principles of CAD, their classification, methods of formalization of the design and construction process, ways of using information technologies to automate design, design and technological work.

### **Learning Outcomes**

ON 5 Design and calculate building structures .

ON 7 Design energy efficient and information modeling of buildings.

### **Learning outcomes by discipline**

ON5 Solve problems in the field of automation of new technologies in geodesic production.

1) solve geodetic tasks to ensure maximum efficiency of the required quality of engineering and geodetic work on buildings and structures

2) choose appropriate methods and tools for geodetic engineering tasks using CAD

3) create designs in CAD and work with them

### **Prerequisites**

Autocad in pojecting

### **Postrequisites**

Final examination

## **Design and estimate work**

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

### **Short description of discipline**

The discipline "Design and estimate business" is included in the cycle of basic disciplines. It provides for issues on determining the price of construction products, taking into account modern conditions and the requirements of the new estimate and regulatory framework of 2001, the rules and procedure for drawing up estimates using the ABC-4RS computer program. The discipline aims to provide an appropriate theoretical level and practical orientation in the issues of design and estimate documentation.

### **Purpose of studying of the discipline**

The purpose of studying the discipline is to form students` theoretical knowledge and practical skills on the issues of estimated pricing and financing of capital construction, the methodology for determining the price of construction products in order to ensure the profitability of construction organizations.

### **Learning Outcomes**

ON 5 Design and calculate building structures .

### **Learning outcomes by discipline**

1 Determines the cost of production costs and the efficiency of construction according to regulatory and economic bases

2 Applies knowledge of project documentation in the design

3 Calculates the construction volumes of buildings, the consumption of materials according to reference books

### **Prerequisites**

Bases of economics, law and ecological knowledge

### **Postrequisites**

Final examination

## **Calculation of structures and systems of buildings by computer programs**

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

### **Short description of discipline**

The discipline "Calculation of structures and systems of buildings by computer programs" makes it possible for students to acquire the necessary knowledge for the application of software complexes (SCAD, LIRA, etc.) when solving professional tasks in individual parts and in general buildings, which is required for a modern design engineer. The calculation of structures is the most responsible when designing residential buildings and buildings for various purposes.

### **Purpose of studying of the discipline**

The objectives of mastering the discipline "Calculation of structures and systems of buildings according to computer programs" are: - study in the theoretical part of the classification of existing CAD systems, and their principles of functioning, including methods of mathematical (computer) modeling.

### **Learning Outcomes**

ON 5 Design and calculate building structures .

ON 7 Design energy efficient and information modeling of buildings.

### **Learning outcomes by discipline**

Plans the organization and technology of construction production of buildings and structures

### **Prerequisites**

Autocad in pojecting

### **Postrequisites**

Final examination

## **Computer-aided design systems in construction**

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

### **Short description of discipline**

The discipline is aimed at acquiring and mastering the theoretical foundations of computer-aided design by students, familiarization with the principles of building modern CAD systems and obtaining skills in solving engineering problems of designing complex technical systems using CAD. Formation of students` theoretical and practical knowledge in the field of development of computer-aided design systems. Modern CAD systems should have elements of "artificial intelligence", for example, have so-called expert designer support systems.

### **Purpose of studying of the discipline**

The purpose of mastering the discipline "CAD in construction" is to form the knowledge, skills and abilities of students to use a computer when performing design work and preparing relevant documentation.

### **Learning Outcomes**

ON 5 Design and calculate building structures .

ON 7 Design energy efficient and information modeling of buildings.

### **Learning outcomes by discipline**

Plans the organization and technology of construction production of buildings and structures

### **Prerequisites**

Autocad in pojecting

### **Postrequisites**

Final examination

## **Documentation, valuation and pricing of construction works**

Discipline cycle	Basic disciplines
------------------	-------------------

Course	3
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline "Estimate documentation, rationing and pricing of construction works" belongs to the block of basic disciplines. To master it, a student must know architecture and economics. The purpose of studying the discipline is to expand the system of knowledge and skills for the development of the estimated cost of construction and the formation of prices for construction products, determining the cost of construction and installation work to perform technical and economic calculations.

### Purpose of studying of the discipline

The purpose of studying the discipline is to expand the system of knowledge and skills for developing the estimated cost of construction and the formation of prices for construction products, determining the cost of construction and installation works for performing technical and economic calculations related to the specifics of the work of construction organizations in the conditions of the development of market relations.

### Learning Outcomes

ON 5 Design and calculate building structures .

### Learning outcomes by discipline

- 1 demonstrates knowledge of estimate documentation and pricing
- 2 distinguishes between normative and actual prices for building materials
- 3 makes local and object estimates, performs a summary estimate calculation

### Prerequisites

Bases of economics, law and ecological knowledge

### Postrequisites

Final examination

## Digital technologies in organizations, management and planning of buildings

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline prepares students ` interest in organizational and technical, experimental research, and digital-related designers: designing modern, reliable, and highly efficient structural elements. Studies concepts of digital technologies and their types; digital technologies in the construction industry; features of modern design methods; methods of developing solutions using CT

### Purpose of studying of the discipline

The purpose of mastering the discipline "Digital technologies in the organization, management and planning of buildings" is to master students ` knowledge of digital and information and communication technologies, basic mathematical and statistical laws.

### Learning Outcomes

- ON 5 Design and calculate building structures .
- ON 7 Design energy efficient and information modeling of buildings.

### Learning outcomes by discipline

Designs energy-efficient and information modeling of buildings

### Prerequisites

Autocad in pojecting

### Postrequisites

Final examination

## Production of metal structures

Discipline cycle	Profiling discipline
Course	3
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline "Manufacture of metal structures" is aimed at studying the technological and transport schemes of metal structures factories. The main materials used for the manufacture of metal structures. Basic operations for the manufacture of metalwork parts. The main characteristics of the equipment for the manufacture of parts and their devices. The purpose of mastering the discipline is to study the basics of designing, manufacturing, strengthening metal structures of buildings and structures, as well as preparing students for professional activity in the field of metal fabrication

### Purpose of studying of the discipline

The purpose of the discipline is to prepare students for professional activity in the field of designing metal structures.

### Learning Outcomes

ON 5 Design and calculate building structures .

### Learning outcomes by discipline

- Designs and calculates building structures
- Be able to develop the technological process of preparation, assembly and welding of certain Structures
- Be able to compile technological documentation and search for the optimal variant of the technological process of assembling metal structures

### Prerequisites

Construction structures

### Postrequisites

Final examination

## Metal structures

Discipline cycle	Profiling discipline
Course	3
Credits count	5
Knowledge control form	Examination

### Short description of discipline

*The discipline "Metal structures" is aimed at studying the technology of manufacturing elements of metal structures. Such as: assembly of lattice solid wall structures; assembly of surface structures; welding of steel structures; assembly of general and control structures; protection*

*of metal structures from corrosion; product quality control.*

*The purpose of mastering the discipline is to form students` functional foundations of design and design features of modern load-bearing and enclosing metal structures of buildings and structures*

### Purpose of studying of the discipline

*The purpose of mastering the discipline" metal structures "is to form students` functional bases of design and features of design of modern lifting and enclosing metal structures of buildings and structures.*

### Learning Outcomes

*ON 5 Design and calculate building structures .*

### Learning outcomes by discipline

*Designs and calculates building structures*

*Formation of design and calculation skills for solving specific engineering problems using design norms, standards, reference books, design automation tools*

*Mastering the principles of design, layout methods and technical- economic analysis of metal structures*

### Prerequisites

*Construction structures*

### Postrequisites

*Final examination*

## Installation of metal structures

Discipline cycle	Profiling discipline
Course	3
Credits count	5
Knowledge control form	Examination

### Short description of discipline

*The purpose of studying the discipline "Installation of metal structures" is the formation of students` functional design fundamentals and design features of modern supporting and enclosing metal structures of buildings and structures; the ability to correctly mount structural materials that provide the necessary reliability indicators of the design object. The technology of installation of metal structures, competent conduct of SMR, installation of equipment, individual structures or the entire structure is being studied.*

### Purpose of studying of the discipline

*The purpose of mastering the discipline "Installation of metal structures" is to study the basics of design, manufacture, installation, reinforcement of metal structures of buildings and structures, as well as to prepare students for professional activity in the field of design of metal structures.*

### Learning Outcomes

*ON 5 Design and calculate building structures .*

### Learning outcomes by discipline

*Designs and calculates building structures*

*To know: technology, methods and processes of installation of metal structures, to have an idea of the installation loads and features of the work of structures during installation*

*Develop a construction plan for the installation of metal structures, make the selection of lifting equipment and the selection of mounting devices*

### Prerequisites

*Construction structures*

### Postrequisites

*Final examination*

## Automations topographergeodetic Work

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

### Short description of discipline

*In this discipline, we study the automation of geodetic measurements. Software features in topographic packages. Satellite navigation devices. Automated technology to create a topographic plan. Organization of work in CREDO-DAT system. Equalization of geodetic networks in CREDO-DAT system. The creation of digital elevation models in the system CREDO-MIX.*

### Purpose of studying of the discipline

*The purpose of this discipline is to study and master modern methods and means of automation of technological processes of topographic and geodetic production.*

### Learning Outcomes



ON 6 Analyze geo research and design foundations.

### Learning outcomes by discipline

The expected results of training in the discipline "Automation of topographic and geodetic works" include the development of skills in using modern geodetic tools and technologies to improve the accuracy and efficiency of work. Students should learn how to use software to process geodetic data and create digital maps and terrain models.

The results of training in the discipline "Automation of topographic and geodetic works" suggest that students will be able to independently use automated systems to perform topographic and geodetic tasks. They will master the skills of processing and analyzing geodetic data using modern software tools, which will increase the accuracy and speed of work

### Prerequisites

Geodesy

### Postrequisites

Final examination

## Geodetic works on the construction of industrial site

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline studies the basic geodetic center work on an industrial site, teaches to carry out the removal in kind of the main and main (overall) axes of buildings, structures, engineering communications from the points of the center geodetic basis. This discipline teaches you to process the measurement results, solve the tasks of transferring the mark to the bottom of the pit and tiers, determine the height of the structure at an inaccessible distance.

### Purpose of studying of the discipline

The objectives of the discipline are to acquire theoretical and practical knowledge necessary for the design, construction and operation of industrial, civil and special-purpose facilities.

### Learning Outcomes

ON 6 Analyze geo research and design foundations.

ON 9 Plan the organization and technology of construction production of buildings and structures.

### Learning outcomes by discipline

The expected results of training in the discipline "Geodetic works on a construction industrial site" suggest that students will master the skills of conducting geodetic measurements and breakdown on construction sites. They will learn how to use modern geodetic tools and technologies to determine coordinates and heights, as well as control the implementation of design decisions. An important aspect is the development of the ability to analyze the results of geodetic works and compile appropriate documentation. Upon completion of the course, students will be ready for practical activities in the field of geodesy, ensuring the accuracy and reliability of the construction process

- Performs the removal in kind of the overall axes of the building,
- solves the tasks of transferring the mark to the bottom of the pit,
- determines the height of the structure

### Prerequisites

Geodesy

### Postrequisites

Final examination

## Geodesic control in construction

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline "Geodetic control in construction" studies the method of production of topographic and geodetic works for solving engineering problems in various sectors of the economy. The discipline "Geodetic control in construction" allows you to reveal such main topics of the course as topographic and geodetic surveys of construction sites; engineering geodetic design of structures; center work; geodetic alignment of structures and technical equipment; monitoring of deformation of structures.

### Purpose of studying of the discipline

The initial requirements necessary for studying the discipline "Geodetic control in construction" include knowledge, skills and abilities formed in the process of studying different disciplines.

### Learning Outcomes

ON 6 Analyze geo research and design foundations.

### Learning outcomes by discipline

The expected results of training in the discipline "Automation of topographic and geodetic works" include the development of students' skills to work with modern geodetic tools and software. Students will be able to effectively apply automated methods for measurements and data analysis, which will improve the quality of geodetic work

- Analyzes geo research and designs foundations
- Solves the issues of control of geodetic measurements in construction,
- conducts geodetic surveys of construction sites

### Prerequisites

Geodesy

### Postrequisites

## Construction and operation of Urban highways

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline "Construction and operation of Urban highways" examines the processes of design, construction and maintenance of road infrastructure in urban conditions. Students study asphalt paving technologies, traffic management and road safety methods. The course also includes a study of current trends in urban road management, including issues of environmental sustainability and traffic flow optimization.

### Purpose of studying of the discipline

The purpose of studying the discipline "Construction and operation of urban highways" is to form students' in-depth knowledge of the principles of design, construction and maintenance of road infrastructure in an urban environment. Students should master the skills of applying modern technologies and methods aimed at improving the safety, sustainability and efficiency of highways, as well as taking into account environmental aspects and the impact on the urban environment.

### Learning Outcomes

ON 8 Determine the cost of production costs and the efficiency of construction according to regulatory and economic bases.

ON 9 Plan the organization and technology of construction production of buildings and structures.

### Learning outcomes by discipline

The expected results of training in the discipline "Construction and operation of urban highways" include the development of students' skills in designing and analyzing road structures, as well as understanding the principles of their operation and maintenance. Students will be able to apply modern technologies and methods of road construction management, ensuring safety and comfort on urban highways. In addition, they will be able to assess the condition of the road infrastructure and develop effective measures to improve and maintain it.

The results of training in the discipline "Construction and operation of urban highways" are aimed at developing students' competencies in the field of design, construction and maintenance of road infrastructure. Students will learn how to assess the condition of roads, develop plans for their repair and modernization, as well as apply modern technologies and materials in the construction process.

### Prerequisites

Technology of construction of buildings and structures

### Postrequisites

Final examination

## Urbanism and city planning

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline "Urbanism and city planning" studies the processes of creation and development of urban spaces. Students will learn about the methods of architectural design, zoning, landscaping and infrastructure solutions to ensure a sustainable and comfortable urban environment that takes into account the needs of the population and the principles of environmental friendliness.

### Purpose of studying of the discipline

The purpose of studying the discipline "Urbanism and Urban Planning" is to form students' understanding of the basics of designing and managing the urban environment. Students learn to analyze the needs of society and develop solutions that contribute to improving the quality of life in cities. An important aspect is the development of methods of sustainable development and harmonious interaction between the natural and social environment.

### Learning Outcomes

ON 8 Determine the cost of production costs and the efficiency of construction according to regulatory and economic bases.

ON 9 Plan the organization and technology of construction production of buildings and structures.

### Learning outcomes by discipline

The expected learning outcomes of the discipline "Urban Studies and Urban Planning" include the ability of students to analyze and design urban spaces taking into account social, economic and environmental factors. Students must demonstrate skills in developing comprehensive urban planning plans that contribute to improving the quality of life of the population. In addition, they will be able to apply modern technologies and methods to solve urgent problems of urban infrastructure.

The results of the study in the discipline "Urbanism and urban Planning" include the formation of a systematic approach to the design and management of urban areas among students. They should be able to develop effective strategies for sustainable urban development, taking into account the needs of residents and environmental aspects. In addition, students will learn how to apply analytical tools and methods to assess current urban problems and develop innovative solutions.

## Prerequisites

The architecture

## Postrequisites

Final examination

## Operation of housing and communal services and Urban infrastructure

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline "Operation of housing and communal services and Urban infrastructure" teaches students methods of management and maintenance of housing and communal services and urban infrastructure. Within the framework of the discipline, the principles of maintenance of buildings, public utilities of urban infrastructure and efficient use of resources are studied. Also methods of budget management of housing.

### Purpose of studying of the discipline

The purpose of studying the discipline "Operation of housing and communal services and urban infrastructure" is to train specialists who are able to effectively manage and maintain housing and communal services systems. The course is aimed at developing skills in analyzing, planning and organizing operational processes, as well as mastering methods to improve the efficiency of urban infrastructure facilities. As a result, students must acquire the knowledge necessary to ensure the safe, high-quality and sustainable operation of infrastructure facilities.

### Learning Outcomes

ON 8 Determine the cost of production costs and the efficiency of construction according to regulatory and economic bases.

ON 9 Plan the organization and technology of construction production of buildings and structures.

### Learning outcomes by discipline

The expected results of training in the discipline "Operation of housing and communal services and urban infrastructure" include the formation of students' knowledge about the principles and methods of effective management of infrastructure facilities, as well as skills in analyzing and solving problems related to their maintenance and repair. Students should learn how to develop measures to improve the reliability and quality of services in the housing and communal services sector, as well as apply modern technologies and approaches to optimize the operation of urban infrastructure systems. In addition, it is assumed that students will be ready to implement innovative solutions and comply with regulatory requirements during the operation of facilities.

The results of the teacher's training in the discipline "Operation of housing and communal services and urban infrastructure" suggest that the teacher will be able to effectively transfer knowledge about modern methods of management and operation of infrastructure, as well as form students' practical skills necessary to solve real problems in this area.

## Prerequisites

Technology of construction of buildings and structures

## Postrequisites

Final examination

## The construction of special buildings and structures

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline considers the following topics: basic concepts and regulatory provisions, technology of engineering preparation of a construction site, technology of construction of earthworks, technology of construction of underground structures, construction of buildings from prefabricated structures, general information on the construction of high-rise and large-span buildings and structures, students mastering the theoretical foundations and regulations of methods of construction of buildings and structures of various structural systems from prefabricated, monolithic and prefabricated monolithic structures

### Purpose of studying of the discipline

The purpose of mastering the discipline "Construction of special buildings and structures" is the formation of the student's competencies in the field of construction of high-rise and large-span buildings and structures, the development by students of the theoretical foundations and regulations of methods for the construction of buildings and structures of various structural systems from prefabricated, monolithic and prefabricated-monolithic structures.

### Learning Outcomes

ON 3 Distinguish the types and properties of building materials and structures used.

ON 5 Design and calculate building structures.

ON 9 Plan the organization and technology of construction production of buildings and structures.

### Learning outcomes by discipline

The expected results of training in the discipline "Construction of special buildings and structures" include the ability of students to develop and implement projects that meet specific requirements and conditions specific to special facilities. Students will learn how to analyze the functional, structural and operational characteristics of such structures, which will allow them to effectively solve problems arising during construction

-demonstrates basic knowledge of the design of special structures,

- uses computer-aided design systems, the AutoCAD program and others for the graphic representation of projects,

- distinguishes between structural systems of buildings

## Prerequisites

Technology of production construction

## Postrequisites

Final examination

## Tests of buildings and structures

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline demonstrates the testing of buildings and structures, their main tasks, methods of testing buildings and structures, reliability, durability, maintainability, failure, operating time, technical resource. Also studies the indicators of reliability, durability and maintainability, the history of the development of methods of testing buildings and structures. The purpose of the discipline "Testing of buildings and structures" is to prepare a bachelor who knows the principles of optimal experiment planning, who is able to establish a correspondence between the actual work of the structure and its design model.

### Purpose of studying of the discipline

The purpose of the discipline "Testing of buildings and structures" is to prepare a bachelor who knows the principles of optimal planning of the experiment, who is able to establish a correspondence between the actual work of the structure and its design model.

### Learning Outcomes

ON 10 Develop technology for testing and reconstruction of buildings.

### Learning outcomes by discipline

The expected results of training in the discipline "Testing of buildings and structures" include the development of students' skills in the field of conducting various types of structural tests to assess their strength, stability and durability. Students will be able to interpret test results and develop recommendations for improving the performance of buildings and structures.

- applies knowledge of structural testing methods in practice
- demonstrates basic knowledge of reliability, durability and maintainability of buildings,
- establishes the correspondence between the actual work of the structure and its model

### Prerequisites

Technology of construction of buildings and structures

### Postrequisites

Final examination

## Control and management of normative documentation at CIW

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline considers the organization of quality control in construction, quality control in the production and acceptance of SMR and the organization of supervision and acceptance of objects. Since the quality of the performance of the SMR largely depends on the knowledge of the performers of the work. The purpose of mastering the discipline is to form knowledge about modern methods of organization and technical methods of quality control of construction and installation works, construction materials, project documentation.

### Purpose of studying of the discipline

The purpose of mastering the discipline "Control and management of normative documentation at the SMR" is to form knowledge about modern methods of organization and technical methods of quality control of construction and installation works, construction materials, project documentation.

### Learning Outcomes

ON 8 Determine the cost of production costs and the efficiency of construction according to regulatory and economic bases.

ON 9 Plan the organization and technology of construction production of buildings and structures.

### Learning outcomes by discipline

The expected results of training in the discipline "Normative and technical documentation in construction" suggest that students will be able to effectively use and interpret building codes and rules necessary for the design and construction of facilities. They will learn how to compile and analyze documentation that meets current standards, which will allow them to ensure the quality and safety of construction work.

- checks the organization of quality control in construction,
- supervises the organization of supervision and acceptance of objects
- selects methods of organization and technical methods of quality control of construction and installation works

### Prerequisites

Technology of production construction

### Postrequisites

Final examination

## Normative and technical documentation in construction

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

### Short description of discipline

Goals and objectives, communication with other disciplines. The concept of normative documents. Methods of standardization. State management of works on The discipline introduces the concept of normative documents, methods of standardization, state management of works on technical regulation. The procedure for the development of BCiR, standards. The purpose of studying the

discipline "Normative and technical documentation in construction": preparation of bachelors to solve professional problems in the field of construction based on the study of the provisions of the main legal and regulatory documents regulating the procedure for the development of regulatory and technical documents

### **Purpose of studying of the discipline**

The purpose of studying the discipline "Normative and technical documentation in construction": preparation of bachelors for solving professional problems in the field of construction on the basis of studying the provisions of the main legal and regulatory documents regulating the procedure for the development of normative and technical documents.

### **Learning Outcomes**

ON 8 Determine the cost of production costs and the efficiency of construction according to regulatory and economic bases.

### **Learning outcomes by discipline**

The expected results of training in the discipline "Normative and technical documentation in construction" include the formation of students` in-depth knowledge about various types of construction documentation and their importance in the design and operation of facilities. Students will be able to successfully develop, analyze and apply regulatory and technical documents in the construction process.

- gets acquainted with the concept of normative documents, standardization methods,
- Classifies regulatory documentation, the procedure for the development of technical regulations,
- applies SNIps, standards, eurocodes in practice

### **Prerequisites**

Design and estimate work

### **Postrequisites**

Final examination

## **The organization, management and planning in building**

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

### **Short description of discipline**

The discipline "Organization, management and planning in construction" aims to train qualified specialists-organizers of construction production who know the basics of organization and planning of construction production and are able to use them in practice in construction organizations. Teaching the discipline "Organization, management and planning in construction" prepares students to work at construction sites as foremen, craftsmen and engineers who are able to organize the construction process

### **Purpose of studying of the discipline**

The purpose of teaching the discipline "Organization, management and planning in construction" is to train qualified specialists-organizers of construction production who know the basics of organization and planning of construction production and are able to use them in practical activities in construction organizations.

### **Learning Outcomes**

ON 5 Design and calculate building structures .

ON 9 Plan the organization and technology of construction production of buildings and structures.

ON 8 Determine the cost of production costs and the efficiency of construction according to regulatory and economic bases.

### **Learning outcomes by discipline**

The expected results of training in the discipline "Organization, Management and Planning in construction" are that students will be able to develop and implement effective strategies for managing construction projects, including resource allocation and time planning. They will learn how to analyze and optimize processes at all stages of construction production, which will increase overall productivity and reduce costs.

- Demonstrates the basics of organization and planning of construction production,
- uses the knowledge of the organization of construction in practical activities in construction organizations.
- plans and manages construction

### **Prerequisites**

Technology of construction of buildings and structures

### **Postrequisites**

Final examination

## **Construction in seismic areas**

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

### **Short description of discipline**

The discipline "Construction in seismic areas" provides the knowledge and skills necessary for the design and construction of unique buildings and structures in earthquake-prone areas. Basic information about earthquakes, their causes, manifestations, and consequences. Causes of earthquakes, types of earthquakes. Earthquake-prone zones of the Earth. The discipline forms knowledge, skills and abilities in the calculation and design of structures of buildings and structures erected and operated in seismic areas.

### **Purpose of studying of the discipline**

The purpose of mastering the discipline "Construction in seismic areas" is to form knowledge, skills and abilities in the calculation and design of structures of buildings and structures erected and operated in seismic areas.

### **Learning Outcomes**

ON 5 Design and calculate building structures .

ON 10 Develop technology for testing and reconstruction of buildings.

### **Learning outcomes by discipline**

The expected learning outcomes of the discipline "Construction in Seismic Areas" include the ability of students to analyze seismic activity and assess the risks associated with design and construction in such conditions. Students will learn how to apply special methods and technologies that ensure the stability of buildings and structures to seismic impacts, as well as develop effective design solutions.

- designs buildings and structures erected in seismic areas
- has an idea about earthquakes and their consequences
- performs calculations of structures taking into account the seismicity of the area

#### **Prerequisites**

Technology of construction of buildings and structures

#### **Postrequisites**

Final examination

### **Technical maintenance of buildings**

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

#### **Short description of discipline**

The discipline studies the main provisions on the production and operation of buildings, regulatory and technical documentation for the operation of buildings and structures. Surveys during the operation of the building. Students study methods of quality control and acceptance of works into operation, labor protection and fire prevention. The objectives of mastering the discipline "Technical operation of buildings" are: To determine the operational qualities of building structures and engineering equipment, as well as the building as a whole.

#### **Purpose of studying of the discipline**

The objectives of mastering the discipline "Technical operation of buildings" are: To determine the operational qualities of building structures and engineering equipment, as well as the building as a whole.

#### **Learning Outcomes**

ON 9 Plan the organization and technology of construction production of buildings and structures.

ON 10 Develop technology for testing and reconstruction of buildings.

#### **Learning outcomes by discipline**

The expected results of training in the discipline "Technical operation of buildings" include the formation of students' knowledge about the principles and methods of technical operation of various types of buildings. They will be able to conduct regular inspections and diagnose structural conditions, as well as develop maintenance and repair plans.

- studies the main provisions on the production and operation of buildings
- demonstrates knowledge of quality control methods and acceptance of works into operation,
- Determines the operational qualities of building structures and engineering equipment, as well as the building as a whole

#### **Prerequisites**

Technology of construction of buildings and structures

#### **Postrequisites**

Final examination

### **Technical operation and testing of buildings and structures**

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

#### **Short description of discipline**

The discipline is basic for bachelors, gives knowledge about the basic provisions for the production and operation of buildings, technical documentation for the operation of buildings, workers' wages, their pricing, collective and labor contracts. The purpose of the discipline is the acquisition by students of knowledge and skills in the field of ensuring trouble-free operation, the required technical condition of building structures and engineering systems, as well as their maintenance.

#### **Purpose of studying of the discipline**

The purpose of the discipline is the acquisition by students of knowledge and skills in the field of ensuring trouble-free operation, the required technical condition of building structures and engineering systems, as well as their maintenance, the development and consolidation of academic and socio-personal competencies.

#### **Learning Outcomes**

ON 9 Plan the organization and technology of construction production of buildings and structures.

#### **Learning outcomes by discipline**

The expected results of training in the discipline "Technical operation and testing of buildings and structures" are that students will be able to conduct a comprehensive analysis of the condition of buildings and structures, identify defects and assess their impact on operational characteristics. They will also learn how to apply test methods to determine the strength, stability and durability of structures, as well as develop recommendations for their maintenance and modernization

Develops technology for testing and reconstruction of buildings

#### **Prerequisites**

Technology of construction of buildings and structures

#### **Postrequisites**

Final examination

### **Technologies of high-rise construction**

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

### Short description of discipline

The discipline studies the general concepts and provisions of technology for the construction of various high-rise and large-span buildings and structures. In this discipline, the design and preparation of production of these works on the construction site and methods and methods of work on the construction of aboveground engineering structures for various purposes, modern methods of construction of high-rise and large-span buildings and structures are considered

### Purpose of studying of the discipline

The purpose of studying the discipline "Technology of high-rise construction" is to familiarize students with the basics of design and modern methods of construction of high-rise and large-span buildings and structures.

### Learning Outcomes

ON 9 Plan the organization and technology of construction production of buildings and structures.

### Learning outcomes by discipline

The technology of building reconstruction within the framework of the discipline "Technologies of high-rise construction" is aimed at studying the features of restoration and modernization of high-rise buildings, including methods of strengthening structures and improving their stability.

- develops projects for high-rise and large-span buildings
- performs calculations of building structures for high-rise buildings
- uses knowledge to select machines and mechanisms for high-rise construction

### Prerequisites

Technology of construction of buildings and structures

### Postrequisites

Final examination

## Pre-diploma practice

Discipline cycle	Profiling discipline
Course	4
Credits count	15
Knowledge control form	Total mark on practice

### Short description of discipline

Pre-diploma practice of students is a stage of training, and made after the development of the program of theoretical and practical courses of delivery by students of all types of intermediate certification provided by the state requirements to the minimum content and level of training of graduates.

### Purpose of studying of the discipline

The purpose of the pre-graduate practice is to prepare the student for solving design and production and technological problems in production and to collect the initial data for working on the diploma project.

### Learning Outcomes

ON 5 Design and calculate building structures .

ON 6 Analyze geo research and design foundations.

ON 8 Determine the cost of production costs and the efficiency of construction according to regulatory and economic bases.

### Learning outcomes by discipline

The expected results of the pre-graduate training include deepening professional skills in the organization and management of construction projects, performing construction calculations and technical documentation, as well as in ensuring safety and quality control at the construction site. Students must demonstrate the ability to analyze design solutions, propose improvements and participate in the implementation of key construction stages. As a result of their pre-graduate practice, they will be ready to work independently in the construction sector and receive completed competencies to protect their final qualifying work.

Develops technology for testing and reconstruction of buildings

### Prerequisites

Industrial practice II

### Postrequisites

Final examination

## Production practice III

Discipline cycle	Profiling discipline
Course	4
Credits count	15
Knowledge control form	Total mark on practice

### Short description of discipline

This course is necessary to collect materials for the diploma project on the basis of practical experience in the current production (production facility). The course is conducted after studying theory blocks, practice and passing the intermediate certification. The information obtained as a result of collecting data for the diploma project, helps students to gain initial professional experience, to test themselves in professional readiness as a future specialist.

### Purpose of studying of the discipline

The purpose of Industrial practice III is to prepare students to solve geodetic tasks to ensure the effectiveness of the required quality required for engineering and geodetic works of buildings and structures

### Learning Outcomes

ON 5 Design and calculate building structures .

ON 6 Analyze geo research and design foundations.

ON 8 Determine the cost of production costs and the efficiency of construction according to regulatory and economic bases.

### **Learning outcomes by discipline**

The expected results of training in "production Practice 3" include the acquisition of practical skills in the design, construction and operation of construction facilities. Students should master the methods of quality control of construction works, analysis of project documentation and practical management of construction processes. During the practice, they learn to apply theoretical knowledge in real conditions and work in a team to solve production tasks, which ensures their preparation for future professional activities.

1) solve problems in the field of automation of new technologies in geodesic production

2) search, analyze and evaluate information necessary for the graduation project

3) apply the acquired theoretical and practical skills and knowledge

### **Prerequisites**

Industrial practice II

### **Postrequisites**

Final examination