CATALOG OF ELECTIVE DISCIPLINES

6B07 - Engineering, Manufacturing and Civil engineering
(Code and classification of the field of education)

6B073 - Architecture and Civil engineering
(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)

6B07301 - Geodesy and Cartography
(Code and name of the educational program)

bachelor
(Level of preparation)

set of 2023

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By the Academic Committee of the EP
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Chairman of the Academic Council I.Oralkanova

Geoinformatics in a cadastre

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

Short description of discipline
The discipline "Geoinformatics in cadastre" is basic and studies the modern state of cadastre and geoinformatics, shows the possibilities of modern GIS technologies in various scientific spheres of agriculture, as well as automation of land cadastre processes. The discipline considers the issues of modeling in the cadastre, studying cadastral registration and evaluation, cadastral maps and methods of creating and editing digital thematic maps by using MAPINFO software.

Purpose of studying of the discipline
The purpose of the discipline is to study natural and socio-economic systems in the cadastre (their structure, connections, dynamics, functioning in space and time) through computer modeling based on databases and geographical knowledge.

Learning Outcomes
ON 6 Process and analyze cartographic information obtained during Earth monitoring to ensure the quality, observation of the digital terrain model

Learning outcomes by discipline
1) Describes the principles of organizing GIS geographic information in the cadastre
2) interprets cartographic information using a PC
3) Demonstrates ability to classify and structure geographic information

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Basic and profile disciplines of the EP

Information security and information protection

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

Short description of discipline
The discipline "Information security and information protection" is a basic discipline that studies the legislation of the Republic of Kazakhstan and foreign countries in the field of protection of intellectual property objects. Protection of information on geodetic and cartographic objects (location of points in the coordinate network) to ensure information security. Protection of infrastructure of geoinformation systems is an urgent task in the modern world.

Purpose of studying of the discipline
To study the state of information security, in which its confidentiality, integrity and availability are ensured.

Learning Outcomes
ON 6 Process and analyze cartographic information obtained during Earth monitoring to ensure the quality, observation of the digital terrain model

Learning outcomes by discipline
1) interpret the basics of information security and the essence of modern systems of organizational and technical protection of information
2) assess the level of information threat and determine the main directions of information protection
3) demonstrate the ability to use basic methods, software and hardware used in information security

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Basic and profile disciplines of the EP

Organization and planning of topographic surveys

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

Short description of discipline
The basic discipline is devoted to the study of the basics of organization and planning of topographic surveys and acquire knowledge about innovative methods and means of surveying, graphic and digital registration of their results. The content of the discipline is aimed at forming the students` ability to apply modern technologies for obtaining field topographic and geodetic data, including aerospace and GIS technologies for mapping territories and construction design, updating the existing stock of maps.

Purpose of studying of the discipline
Acquaintance with the organization and planning of topographic work, the study of modern technologies and methods of topographic surveys, the possibilities of computer and satellite technologies for automating field measurements and creating original topographic plans, mastering innovative methods of topographic work.

Learning Outcomes
ON 3 Use the fundamentals of cartography and geodesy to solve various problems on the ground
ON 7 Perform geodetic work related to the creation of a survey justification for cadastral surveys and the assessment of relief-forming processes, analyze and process geodetic data and assess the characteristics of the relief

Learning outcomes by discipline
1) present the basics of organization and planning of topographic surveys and knowledge of innovative methods and means of surveying, graphic and digital design of their results.
2) use computer and satellite technologies to obtain field measurement data and create original large-scale topographic plans.
3) demonstrate skills of organizing and planning topographic surveys to solve problems of territory mapping and construction design, updating the existing stock of maps
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Basic and profile disciplines of the EP

The complex of topographic and geodesic works during engineering surveys in construction

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

Short description of discipline
The discipline «The complex of topographic and geodesic works during engineering surveys in construction» examines the basics of topographic-geodesic works in construction, in particular methods, means and technologies of work at the stage of engineering surveys. The content includes topics that consider modern technology complex problem, economic and technical research area of future construction, in order to obtain the information necessary to solve the main problems of design, construction and operation of buildings and structures.
Purpose of studying of the discipline
When carrying out construction activities, it studies topographic and geodetic works.
Learning Outcomes
ON 8 Solve geodetic problems aimed at ensuring maximum efficiency and the required quality of engineering and geodetic work in the design, construction and operation of buildings and structures.
Learning outcomes by discipline
1) present the basic principles of the organization of topographic and geodesic works during construction, in particular methods, means and technologies of work performed at the stage of engineering surveys.
2) apply modern technologies of geodetic surveying of future construction area in order to obtain the information necessary to solve the main tasks of design, construction and operation of buildings and structures.
3) to offer the acquired skills of geodetic works for high-precision support of construction at the stage of surveys.
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Basic and profile disciplines of the EP

Fundamentals of Structural Safety of Buildings and Structures

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

Short description of discipline
The discipline "Fundamentals of Structural Safety of Buildings and Structures" is a basic discipline of the educational program, studying the basic concepts and methods in the field of buildings and structures safety during construction and operation to solve a number of state and construction tasks. In the course of study students will be able to predict potential risks and develop measures to eliminate them.
Purpose of studying of the discipline
The purpose of mastering the discipline is the formation of knowledge, skills and abilities to determine the structural safety of buildings and structures at the stages of design, construction and operation of residential and industrial buildings and structures
Learning Outcomes
ON 8 Solve geodetic problems aimed at ensuring maximum efficiency and the required quality of engineering and geodetic work in the design, construction and operation of buildings and structures.
ON 9 Make geodetic measurements related to solving typical construction tasks
Learning outcomes by discipline
1)reproduce the main activities carried out at various levels of management to ensure the safe operation of buildings and structures;
2) determine the physical deterioration of buildings, their structural elements and systems and ensure the safety of buildings and structures in complex natural and natural-technogenic conditions;
3) demonstrate the ability to use regulatory documents in the operation of buildings and structures
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Basic and profile disciplines of the EP

Electronic instruments and methods of geodetic measurements

Discipline cycle	Basic disciplines
Course	3
Credits count	5

Knowledge control form	Examination

Short description of discipline
A discipline that studies electronic instrumentation, equipment, and technology for performing topographic surveys, as well as methods and algorithms for cameral processing heterogeneous topographic and cartographic data for the purposes of compiling and updating topographic plans and maps. The content of the discipline is aimed at forming the future specialist`s professional competence in the application of innovative technologies for geodetic measurements based on the use of laser, electronic and automated systems.

Purpose of studying of the discipline
To teach students to conduct topographic surveys using modern instruments, equipment and technologies; - processing of heterogeneous topographic and cartographic information for the purposes of compiling and updating topographic plans and maps;

Learning Outcomes
ON 5 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.

Learning outcomes by discipline
1) present a basic knowledge of modern instruments, equipment and technology used to carry out topographic surveys in the field.
2) apply the ability to comply with the requirements of technical regulations and instructions for the execution of topographic surveys and cameral design of the original topographic maps and plans.
3) to offer the acquired skills of applying innovative technologies of geodetic measurements in solving professional tasks in various fields of science and industry.

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Basic and profile disciplines of the EP

Aerosurvey

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

Short description of discipline
A discipline that studies a set of works for obtaining topographic maps, plans and CMM using materials for photographing terrain from aircraft or from space. It considers one of the main types of survey work, which allows, with a sharp increase in the productivity of field work, to transfer the bulk of the work on obtaining information about the area to the office conditions using automation and computer technology.

Purpose of studying of the discipline
The purpose of studying the special discipline "Aerial Photography" is to provide students with knowledge, skills and abilities to conduct geodetic measurements and calculations using planned aerial photographs of landscape construction objects.

Learning Outcomes
ON 4 Demonstrate the ability to draw plans and maps of the terrain using traditional and modern methods

Learning outcomes by discipline
1. study methods and techniques for determining shapes, sizes, and positions in space;
2. classify special equipment installed on aircraft or spacecraft for aerial photography;
3. Distinguish the types of aerial photos

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Basic and profile disciplines of the EP

Geodetic support for the construction of engineering structures

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

Short description of discipline
The discipline "Geodetic support for the construction of engineering structures" introduces students to the basic methods and tools of geodetic measurement and control in the construction process. Students learn the principles of selecting and placing geodetic networks, perform topographic and geodetic work, and analyze and interpret the data obtained. Learners will be able to apply the data obtained in practice to ensure the quality and accuracy of construction projects.

Purpose of studying of the discipline
The purpose of the discipline "Geodetic support for the construction of engineering structures" is to familiarize students with the basic methods and tools of geodetic measurement and control in the process of construction of engineering structures. The main goal is to prepare students to use surveying software to ensure the quality and accuracy of construction projects.

Learning Outcomes
ON 9 Make geodetic measurements related to solving typical construction tasks

Learning outcomes by discipline
1) Apply the basic methods and tools of geodetic measurement and control in the process of construction of engineering structures.
2) Analyze and interpret the data obtained as a result of geodetic measurements in order to ensure the quality and accuracy of construction projects.
3) Perform topographic and engineering geodetic work, including the selection and placement of geodetic networks, using the acquired knowledge and skills.

Prerequisites
Applied Geodesy
Postrequisites
Basic and profile disciplines of the EP

Digital models and terrain maps

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

Short description of discipline
The discipline is based on the study of digital maps of the terrain in the form of theory and practice, the use of cartographic information and different methods, such as digital technical, as well as, obtaining and using, updating and changing methods of storage of digital maps. Also in the course of the discipline will be mastered the future of scientific and technical design of digital maps with a digital model of the Earth, the compilation and means of processing, also the application of information on digital maps.
Purpose of studying of the discipline
The purpose of studying this discipline is to form basic ideas among future specialists about the methods of creating and analyzing digital terrain models using geographic information systems (GIS) and using them in various fields of geoecology, hydrology, geomorphology, nature management, etc.
Learning Outcomes
ON 4 Demonstrate the ability to draw plans and maps of the terrain using traditional and modern methods
Learning outcomes by discipline
1) recognize three-dimensional terrain models:
2) model and demonstrate techniques for obtaining digital models and maps of the terrain;
3) demonstrate the ability to work with geographic information products.
Prerequisites
Applied Geodesy
Postrequisites
Basic and profile disciplines of the EP

Geodetic monitoring of engineering buildings and structures

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

Short description of discipline
The discipline allows students to master the methods and techniques of geodetic monitoring to monitor and control the state of construction objects. Students learn the principles of working with modern equipment, analyze the data obtained and evaluate the deformations and movements of structures. The course includes practical exercises where students monitor real objects and analyze the results to make appropriate decisions and ensure the safety of structures
Purpose of studying of the discipline
Training of future specialists in the basics of theoretical and practical knowledge on the main types of geodetic works to determine precipitation and displacement of buildings and structures, as well as in solving various engineering problems related to landslide processes
Learning Outcomes
ON 8 Solve geodetic problems aimed at ensuring maximum efficiency and the required quality of engineering and geodetic work in the design, construction and operation of buildings and structures.
Learning outcomes by discipline
1) Monitor real objects and analyze the results obtained to make appropriate decisions and ensure the safety of structures.
2) Analyze the received data and evaluate the deformations and displacements of structures using modern equipment.
3) Demonstrate the methods and techniques of geodetic monitoring to monitor and control the condition of construction sites.
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Final examination

Methods of creation and development of the state geodetic network

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

Short description of discipline
The discipline is aimed at the effective and widespread use of traditional and satellite geodesy methods in the construction of state geodetic networks. The questions of construction and adjustment of satellite geodetic networks are considered. A high-precision geodetic network, class 1 satellite geodetic networks and special-purpose geodetic networks are being studied. The specifics of the creation and development of state geodetic networks for geodetic and navigational positioning, use in the fields of science, technology, economics.
Purpose of studying of the discipline
Get acquainted with the theoretical and practical issues of the construction and equalization of satellite geodetic networks, which

include a high-precision geodetic network, satellite geodetic networks of the 1st class and geodetic networks of special purpose. To form general cultural and professional competencies in the field of creation and development of state geodetic networks, their practical application for geodetic and navigation positioning, their use in various fields of science, technology, economics.

Learning Outcomes

ON 6 Process and analyze cartographic information obtained during Earth monitoring to ensure the quality, observation of the digital terrain model

Learning outcomes by discipline

1)Describe the basic concepts, terms and principles of construction and adjustment of the state geodetic network.
2)Describe the development methodology and principles for building state geodetic networks.
3)Demonstrate skills in using the basics of cartography and geodesy in solving various problems of geodesy on the ground.

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination

Pre-diploma practice

Discipline cycle	Profiling discipline
Course	4
Credits count	7
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. Pre-diploma practice is carried out for students to master the initial professional experience, check the professional readiness of the future specialist to self-employment

Purpose of studying of the discipline

- analysis of the collected theoretical and practical material for use in the work on the diploma project.
- application of the obtained theoretical and practical skills and knowledge to improve the competence of the graduate

Learning Outcomes

ON 8 Solve geodetic problems aimed at ensuring maximum efficiency and the required quality of engineering and geodetic work in the design, construction and operation of buildings and structures.
ON 10 Demonstrate a comprehensive set of professional skills necessary for successful work in the surveying industry, such as the development of academic writing skills, the ability to work with regulatory and technical documentation, an understanding of the economic and management aspects of surveying production

Learning outcomes by discipline

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

Software in cartography

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

Short description of discipline

The study of the discipline will deepen the knowledge of students using theory and practice when creating cartographic material using programs - AutoCAD, MapInfo, CredoDAT. Features of GIS are primarily due to the increasing importance of software in the current development and the need for mapping. The specifics of the development and study of the basics of programming modules and programs for GIS, carried out within the framework of.

Purpose of studying of the discipline

To form students` understanding of the use of animation, multimedia and Internet technologies in cartography, to introduce professional developments of new geoinformation technologies using the Internet.

Learning Outcomes

ON 6 Process and analyze cartographic information obtained during Earth monitoring to ensure the quality, observation of the digital terrain model

Learning outcomes by discipline

1)Describe the basic terms and concepts in mapping software.
2)Classify ways of exchanging geoinformation data.
3) Demonstrate the skills of making geodetic measurements related to solving construction problems.

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination

Production practice III

Discipline cycle	Profiling discipline
Course	4

Credits count	7
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 8 Solve geodetic problems aimed at ensuring maximum efficiency and the required quality of engineering and geodetic work in the design, construction and operation of buildings and structures.
ON 10 Demonstrate a comprehensive set of professional skills necessary for successful work in the surveying industry, such as the development of academic writing skills, the ability to work with regulatory and technical documentation, an understanding of the economic and management aspects of surveying production

Learning outcomes by discipline
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

The theory of mathematical processing of geodetic measurements

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

Short description of discipline
The discipline contains a systematic description of preliminary, equalizing and final calculations of planned geodetic networks and processing of the results. It also discusses the issues of establishing coordinate systems, relationships between them, reducing the results of field measurements to them, and some other issues. Due attention in the discipline is paid to the use of computers in which tasks are solved when processing measurements.

Purpose of studying of the discipline
The purpose of the discipline is to master students` knowledge in the field of mathematical processing of initial measurement information and equation calculations for solving scientific and practical geodetic problems, taking into account measurement errors in the creation of geodetic networks

Learning Outcomes
ON 2 Process the information obtained about the object of study using the methods of natural science disciplines
ON 8 Solve geodetic problems aimed at ensuring maximum efficiency and the required quality of engineering and geodetic work in the design, construction and operation of buildings and structures.

Learning outcomes by discipline
1. to develop effective methods of mathematical processing of various parametric equations arising in the alignment of geodetic networks;
2. demonstrate possibilities of practical realization of methods of mathematical statistics based on computer technologies of mathematical processing of measurements performed by both traditional and satellite methods;
3. use computer programs necessary for data processing

Prerequisites
Mathematics Introduction to the Profession of Surveyor-Cartographer

Postrequisites
Basic and profile disciplines of the EP

The theory of mathematical processing of geodetic measurements

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

Short description of discipline
The discipline is devoted to studying the necessary information from probability theory and mathematical statistics, forming a clear understanding of the principles of processing geodetic measurements, as well as professional and general cultural competencies, teaching theoretical foundations and practical skills in mathematical processing of geodetic measurement results. Also, the theory of errors, equalization and design of geodetic networks are considered.

Purpose of studying of the discipline
teaching theoretical foundations and practical skills in mathematical processing of geodetic measurement results

Learning Outcomes
ON 2 Process the information obtained about the object of study using the methods of natural science disciplines
ON 8 Solve geodetic problems aimed at ensuring maximum efficiency and the required quality of engineering and geodetic work in the design, construction and operation of buildings and structures.

Learning outcomes by discipline
1) demonstrate knowledge of the patterns of occurrence and distribution of measurement and calculation errors;
2) evaluate the accuracy of functions of measured quantities;
3) perform mathematical processing of the results of several measurements of one and the same quantity
Prerequisites
Mathematics Introduction to the Profession of Surveyor-Cartographer
Postrequisites
Basic and profile disciplines of the EP

Adjustment measurements

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

Short description of discipline
The discipline examines the main provisions of the theory of calculating errors of direct and indirect measurements, provides recommendations on the construction of graphs of measured dependencies, provides a concrete example of the design of a report on laboratory work. The appendix provides the basics of presenting the measurement result in modern terms of the uncertainty of the result. This discipline gives them the opportunity to get a clear idea of the rules for processing the results of their measurements, which they perform in practical work.
Purpose of studying of the discipline
The purpose of studying the discipline is to form students with a minimum of knowledge in the field of measurements, which allows a young specialist to improve in the future, independently make technical decisions at the international, regional and national levels, as well as skills in applying methods and practical basics of the course in calculating errors of measuring instruments, total errors of measuring channels.
Learning Outcomes
ON 2 Process the information obtained about the object of study using the methods of natural science disciplines
ON 8 Solve geodetic problems aimed at ensuring maximum efficiency and the required quality of engineering and geodetic work in the design, construction and operation of buildings and structures.
Learning outcomes by discipline
1. know the basics of the theory of measurement results processing;
2. review the basic concepts of the theory of calculation of errors of the main types of measurements;
3. Demonstrate knowledge of the fundamentals of the theory of processing measurement results.
Prerequisites
Mathematics Introduction to the Profession of Surveyor-Cartographer
Postrequisites
Basic and profile disciplines of the EP

Laser scanners in geodesy

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

Short description of discipline
Students learn the principles of operation of ground laser scanners, acquaint with the history of laser scanners, pass laser location methods and traditional methods of topographic surveying, methods of laser-location images acquisition, information about navigational support of laser location, airborne laser- location survey. During the discipline they receive information about the concept of laser-location methods of collecting geospatial data, economic aspects of laser-location means, information about instrumental means of laser scanners.
Purpose of studying of the discipline
The purpose of studying the discipline is to get acquainted with laser scanners, the technique of terrestrial laser scanning, as well as its application in applied geodesy. Mastering software products for processing laser scanning data, their main functions and choosing the right software product
Learning Outcomes
ON 5 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.
ON 8 Solve geodetic problems aimed at ensuring maximum efficiency and the required quality of engineering and geodetic work in the design, construction and operation of buildings and structures.
Learning outcomes by discipline
1) solve geodetic tasks to ensure maximum efficiency of the required quality of engineering and geodetic works of buildings and constructions
2) apply technologies and methods of geodetic measurements with a laser scanner
3) to process the measurement results by means of laser scanning data processing software products
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Basic and profile disciplines of the EP

Software packages for computer-aided design

Discipline cycle	Basic disciplines
Course	2
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 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.

Learning outcomes by discipline
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
Basic and profile disciplines of the EP

Postrequisites
Basic and profile disciplines of the EP

Modern technologies in geodesic production

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

Short description of discipline
The discipline "Modern technologies in geodesic production" is necessary to expand the knowledge and skills of students in various areas of geodesy and familiarization with modern methods and instruments to perform high-precision geodetic works, as well as to master the software products for high-precision measurement processing tasks and study the processing in these programs to solve scientific and practical geodetic tasks.

Purpose of studying of the discipline
The discipline introduces students of geodesists to modern methods and instruments for performing high-precision geodetic works and discusses in detail software products for processing high-precision measurements.

Learning Outcomes
ON 3 Use the fundamentals of cartography and geodesy to solve various problems on the ground
ON 5 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.

Learning outcomes by discipline
1) use the basics of cartography and geodesy in solving various tasks on the ground
2) apply technologies and methods of geodetic measurements
3) use modern geodetic instruments and processing skills in professional programs

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Basic and profile disciplines of the EP

New technologies of cartographic production

Discipline cycle	Profiling discipline
Course	3
Credits count	7
Knowledge control form	Examination

Short description of discipline
The discipline "New technologies of cartographic production" is a discipline studying the application of new technologies and methods of cartographic production to solve scientific and practical geodetic and cartographic problems. During the study of the discipline students learn how to make and edit maps, basic methods of researching phenomena on maps and plans, the requirements for new types of geodetic maps and plans.

Purpose of studying of the discipline
Studies the theory and methods of cartographic mapping of objects and phenomena of nature and society, that is, the construction of the map language, cartographic sign systems; artistic design of maps (cartographic design), their colorful design in relation to new information technologies, based on the development of the design of maps and cartographic semiotics.

Learning Outcomes

ON 4 Demonstrate the ability to draw plans and maps of the terrain using traditional and modern methods
ON 5 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.

Learning outcomes by discipline

1) apply new cartographic technologies
2) model maps using automated cartographic methods
3) demonstrate proficiency in new methods and techniques of map editing

Prerequisites

Introduction to the Profession of Surveyor-Cartographer Geodetic Instrumentation

Postrequisites

Basic and profile disciplines of the EP

Modern geodetic instruments and technologies

Discipline cycle	Profiling discipline
Course	3
Credits count	7
Knowledge control form	Examination

Short description of discipline

The discipline studies the use of modern geodetic instruments and technologies for solving scientific and practical geodetic problems. Students will be able to master the technical characteristics, design and methods of geodetic measurements of geodetic instruments and equipment widely used in modern geodetic work. The discipline allows you to study the methods of geodetic measurements, automation of methods for recording radiation and line measurements, as well as mathematical processing of measurement results obtained by digitalization and others.

Purpose of studying of the discipline

The main goal of this discipline is to master the knowledge and skills of students in the use of modern geodetic instruments and technologies to solve scientific and practical geodetic problems.

Learning Outcomes

ON 5 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.

Learning outcomes by discipline

1) apply modern geodetic instruments and technologies to solve various geodetic problems
2) demonstrate the skills of mathematical processing of measurement results obtained using digitization methods and other modern technologies
3) evaluate the technical characteristics, device and methods of geodetic measurements of instruments and equipment widely used in modern geodetic work

Prerequisites

Introduction to the Profession of Surveyor-Cartographer Geodetic Instrumentation

Postrequisites

Basic and profile disciplines of the EP

Technology of creating geodetic reference networks by modern methods

Discipline cycle	Profiling discipline
Course	3
Credits count	7
Knowledge control form	Examination

Short description of discipline

The discipline "Technology of creating geodetic reference networks by modern methods" is a discipline that studies the geodetic reference networks, technologies and methods of creating networks. This course allows you to study modern methods of creating geodetic networks, as well as the implementation of topographic survey of different scales, the removal of building axes in reality and other tasks of geodetic production necessary to solve scientific and practical geodetic tasks.

Purpose of studying of the discipline

Carrying out a complex of practical and computational work in order to study the technology of creating reference and survey geodetic networks using global navigation satellite systems

Learning Outcomes

ON 5 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.

Learning outcomes by discipline

1) Recognize angular measurement methods implemented in terrestrial laser scanners.
2) apply laser instruments in the alignment of structures and equipment
3) demonstrate the ability to use laser-location surveying techniques and technology.

Prerequisites

Introduction to the Profession of Surveyor-Cartographer Geodetic Instrumentation

Postrequisites

Basic and profile disciplines of the EP

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 3 Use the fundamentals of cartography and geodesy to solve various problems on the ground
ON 5 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.

Learning outcomes by discipline
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
Topographical drawing

Postrequisites
Final examination Smart technologies in construction Digital technologies in the organization, management and planning of buildings BIM-technologies in the design, construction and operation of buildings and structures

Autocad in pojecting

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

Short description of discipline
The discipline is devoted to the study of the AutoCAD program, mastering the AutoCAD interface, creating 2D/3D models. In the process of studying this discipline, students learn how to draw various drawings in this program, edit, form images of various formats, draw projections of objects, form an image of schemes using AutoCAD. Two-and three-dimensional modeling is also implemented: the main elements of 3D modeling, the creation of orthogonal projections. Learn to draw two- dimensional and three- dimensional 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 3 Use the fundamentals of cartography and geodesy to solve various problems on the ground
ON 5 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.

Learning outcomes by discipline
1) determine suitable methods and tools for solving engineering and geodetic problems using AutoCAD;
2) demonstrate the skills of drawing and working with projects in AutoCAD;
3) import data into AutoCAD and create digital terrain models and road plans based on them;
4) calculate the volume of earthworks using various methods and perform other 3D modeling work.
5) demonstrate the skills of using the AutoCad program in solving problems of automated 2D and 3D design

Prerequisites
Topographical drawing

Postrequisites
Final examination Smart technologies in construction Digital technologies in the organization, management and planning of buildings BIM-technologies in the design, construction and operation of buildings and structures

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 3 Use the fundamentals of cartography and geodesy to solve various problems on the ground
ON 5 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.
Learning outcomes by discipline
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
Topographical drawing
Postrequisites
Final examination Smart technologies in construction Digital technologies in the organization, management and planning of buildings BIM-technologies in the design, construction and operation of buildings and structures

BIM-technologies in the design, construction and operation of buildings and structures

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

Short description of discipline
The discipline allows students to master key tools, such as Autodesk Revit and AutoCAD Civil 3D, for creating information models of buildings and structures. Students learn the basics of working with the software, including creating geodetic models, integrating geodata, analyzing spatial relationships, and visualizing results. The course also includes practical exercises during which students develop projects using BIM technologies, taking into account the geodetic aspects of design, construction and operation
Purpose of studying of the discipline
The purpose of the discipline is to provide students with key skills and knowledge in the use of Autodesk Revit software, AutoCAD Civil 3D and BIM technologies for the design and modeling of buildings and structures, taking into account geodetic aspects.
Learning Outcomes
ON 5 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.
Learning outcomes by discipline
1) develop projects using Autodesk Revit and AutoCAD Civil 3D and perform practical tasks that require the integration of geodetic information into the design and construction process.
2) apply BIM technologies in the design, construction and operation of buildings and structures, taking into account geodetic aspects.
3) develop projects, taking into account geodetic aspects, and perform tasks related to the integration of geodata, analysis of spatial relationships and visualization of results using BIM technologies.
Prerequisites
Computer graphics in construction Computer drawing in design Topographical drawing Autocad in pojecting
Postrequisites
Basic and profile disciplines of the EP 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 mastering new technologies by optimizing technological modes.
Learning Outcomes
ON 5 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.
Learning outcomes by discipline
1) perform design and engineering work for the construction and reconstruction of buildings and structures using Smart technologies
2) apply methods of analysis and perform calculations of structures of buildings and structures, engineering systems, including the use of modern software products;
3) design energy efficient and information modeling of buildings
Prerequisites
Computer graphics in construction Computer drawing in design Topographical drawing Autocad in pojecting
Postrequisites
Basic and profile disciplines of the EP Final examination

Digital technologies in the organization, management and planning of buildings

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

Short description of discipline
The discipline "Digital technologies in the organization, management and planning of buildings" prepares students for organizational, technical, experimental, research and design work associated with modern technology: modeling modern, high-performance structural elements of buildings and structures. The discipline considers questions about digital technologies and their types; digital technologies in the construction industry; the specifics of the current methods of design; technologies for developing solutions using computer technology.

Purpose of studying of the discipline
The purpose of studying the subject is to introduce future engineers to the prospects and examples of using digital technologies to improve the efficiency and quality of construction.

Learning Outcomes
ON 5 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.

Learning outcomes by discipline
1) use the necessary software for project management, project programs
2) Analyze the effectiveness of a construction project
3) demonstrate the ability to apply digital technology to automate processes for decision making in project management

Prerequisites
Computer graphics in construction Computer drawing in design Topographical drawing Autocad in pojecting

Postrequisites
Basic and profile disciplines of the EP Final examination

Mapping modeling

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

Short description of discipline
The discipline "Mapping modeling" is the basic one, which introduces students to the basic methods and techniques for creating and visualizing cartographic models. The discipline will allow you to study the principles of generating high-rise models, creating digital elevation models and spatial data analysis. The discipline also includes mastery of specialized modeling software, which allows the development of informative maps and geographic information systems based on geospatial data.

Purpose of studying of the discipline
The acquisition by students of general and special knowledge and skills in modeling the thematic content of maps in scientific and practical activities, as well as the formalized use of cartographic models in conducting geographical research.

Learning Outcomes
ON 6 Process and analyze cartographic information obtained during Earth monitoring to ensure the quality, observation of the digital terrain model

Learning outcomes by discipline
1) create cartographic models using various methods and techniques, including generation of elevation models, digital elevation model and spatial data analysis.
2) demonstrate skills to interpret and visualize spatial data, which allows them to create informative and visual cartographic products.
3) use skills of using specialized software for cartographic modeling, work effectively with geospatial data and create high-quality maps and geographic information systems.

Prerequisites
Cartography

Postrequisites
Basic and profile disciplines of the EP

Map projection and computer design

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

Short description of discipline
The discipline "Map projection and computer design" is a basic discipline that studies methods of designing maps and atlases of various types, properties, perception, as well as the rules of applying graphics in the design of cartographic works to solve scientific and practical geodetic and cartographic problems. Studying this discipline will allow you to quickly, with high quality design various topographic-geodesic and cartographic materials in the software, as well as to master the subtleties of computer design.

Purpose of studying of the discipline
Formation of students` knowledge, skills and practical skills in the field of the basics of theory and practice of design of cartographic works, visual aids, their properties and rules of application in the design of various maps and atlases, computer methods of graphic production of originals

Learning Outcomes

ON 3 Use the fundamentals of cartography and geodesy to solve various problems on the ground
ON 6 Process and analyze cartographic information obtained during Earth monitoring to ensure the quality, observation of the digital terrain model

Learning outcomes by discipline

1) learn the basic conceptual and terminological apparatus of cartography, map design and computer design; basic theory and practice of designing cartographic works;
recognize the properties and rules of application of graphic means in the design of various maps and atlases;
2) use the conceptual and terminological apparatus of cartography, design and computer design of maps; apply the basics of the theory of design of cartographic works in practice;
3) demonstrate the ability to create and design cartographic works using computer methods of graphic production of original maps

Prerequisites

Cartography

Postrequisites

Basic and profile disciplines of the EP

Drafting, editing and publishing maps

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

Short description of discipline

The discipline "Drawing, editing and publishing maps" will introduce students to the basic principles of creating and editing cartographic materials. The discipline provides an opportunity to study the methods of collecting and processing geodetic data, to analyze various cartographic projections and symbolism. In addition, the discipline will allow them to master the software for creating and editing maps, which allows them to design and publish high-quality cartographic products that meet modern requirements and standards

Purpose of studying of the discipline

To give a more complete picture of geographical maps and other cartographic works, as a special way of displaying reality. To acquaint with methods of creating maps, both with traditional and geographic information systems. This perception of geographical maps increases the efficiency of their use in scientific research and practical activities.

Learning Outcomes

ON 6 Process and analyze cartographic information obtained during Earth monitoring to ensure the quality, observation of the digital terrain model

Learning outcomes by discipline

1) Create and edit cartographic materials, including maps of various scales and subjects, taking into account the principles of composition, color design and symbolism.
2) To analyze and choose the optimal cartographic projections, taking into account the characteristics of the subject area and the goals of the cartographic product.
3) Apply knowledge of software for creating and editing maps, work with geodetic data, introduce new technologies and methods in the process of compiling and publishing cartographic products

Prerequisites

Cartography

Postrequisites

Basic and profile disciplines of the EP

Automation of photogrammetric works

Discipline cycle	Profiling discipline
Course	3
Credits count	7
Knowledge control form	Examination

Short description of discipline

The discipline is devoted to the study of methods, technologies and means of automated photogrammetric processing of images obtained by aerospace and ground survey systems and obtaining a digital terrain model. The discipline focuses on consideration of theoretical foundations of digital photogrammetry associated with the processing of digital images to solve various problems of processing aerial survey and remote sensing data and questions about modern hardware and software.

Purpose of studying of the discipline

It teaches the transformation of digital images, digital processing of aerial photographs, modeling of topographic characteristics of the terrain, creating digital terrain models.

Learning Outcomes

ON 5 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.
ON 6 Process and analyze cartographic information obtained during Earth monitoring to ensure the quality, observation of the digital terrain model

Learning outcomes by discipline

1) introduce basic methods of digital photogrammetric image processing, techniques for extracting spatial information and creating digital terrain models based on aerial survey and remote sensing data.
2) use modern hardware and software for processing aerial survey and remote sensing data.
3) demonstrate the ability to process and interpret aerospace sensing data to perform a set of mapping and research work to develop and update topographic, thematic maps and other documents of terrain and objects.

Prerequisites

GIS in Geodesy and Cartography

Postrequisites

Basic and profile disciplines of the EP

Technology of photogrammetric processing of aerospace images

Discipline cycle	Profiling discipline
Course	3
Credits count	7
Knowledge control form	Examination

Short description of discipline

A major discipline that studies modern methods and algorithms of photogrammetric processing of aerospace imagery and remote sensing data and synthesis of thematic layers of geospatial information used to solve problems of creating digital topographic products for various purposes. Students study the basics of photogrammetric processing of aerial and satellite images to create orthophotomaps of terrain, digital situation models, digital terrain models and digital terrain models.

Purpose of studying of the discipline

The purpose of mastering the discipline is to familiarize students with the methods of photogrammetric processing of remote sensing data and ground photography.

Learning Outcomes

ON 5 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.

ON 6 Process and analyze cartographic information obtained during Earth monitoring to ensure the quality, observation of the digital terrain model

Learning outcomes by discipline

1) present basic knowledge of modern methods and algorithms for photogrammetric processing of aerospace images and remote sensing data, requirements to the quality of digital models and to the performance of technologies used for their production.

2) Demonstrate the ability to master aerospace mapping and modeling methods based on computer technologies for processing and interpretation of images of different types.

3) offer reasonable options of technologies for creating and updating topographic maps and plans by photogrammetric methods, including the construction of orthophotomaps of the ground, digital situation models, digital terrain models and digital terrain models.

Prerequisites

GIS in Geodesy and Cartography

Postrequisites

Basic and profile disciplines of the EP

Photogrammetry and remote sensing

Discipline cycle	Profiling discipline
Course	3
Credits count	7
Knowledge control form	Examination

Short description of discipline

The discipline "Photogrammetry and remote sensing" is devoted to the study of the basic principles and methods of processing photogrammetric data and data obtained by remote sensing of the Earth. Students learn the processes of capturing, analyzing and interpreting images, as well as master specialized software for data processing and modeling. The course also covers important applications of photogrammetry and remote sensing in the fields of geodesy, geology, ecology and geoinformatics

Purpose of studying of the discipline

study of theoretical and practical knowledge on the main types of photogrammetric processes, methods for their evaluation and analysis of the quality of the obtained materials, correction of maps and plans, as well as in solving various engineering problems related to the creation of maps and plans of various scales and thickening of the reference photogrammetric network.

Learning Outcomes

ON 5 Demonstrate skills and abilities in the field of geodetic data processing, analysis of measurement results, development and application of geographic information systems, as well as methods and tools for optimizing and improving geodetic production processes.

ON 6 Process and analyze cartographic information obtained during Earth monitoring to ensure the quality, observation of the digital terrain model

Learning outcomes by discipline

1) analyze and interpret photogrammetric and remotely sensed data, which will allow them to extract valuable information about the Earth`s surface, objects and their characteristics.

2) apply methods and techniques for processing and visualizing photogrammetry and remote sensing data to create three-dimensional models, digital elevation models, image mosaics and other cartographic products.

3) demonstrate understanding of the principles and technologies of photogrammetry and remote sensing, apply these methods in various fields such as geodesy, geology, architecture, agriculture and geographic information systems.

Prerequisites

GIS in Geodesy and Cartography

Postrequisites

Basic and profile disciplines of the EP

Soil bonitization and land valuation

Discipline cycle	Profiling discipline
Course	2

Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is devoted to the formation of basic knowledge about the living shell of the Earth - soil, properties, formation, the study of the soil formation process, the influence of environmental factors; the role of soil in nature. Students study the role of soil in the conservation of biological diversity; the importance of soil in human life, the pattern of zonal distribution of soils on the Earth`s surface; soil fertility, its categories, elements, as well as changes in the agricultural use of soils.

Purpose of studying of the discipline
The objectives of the discipline (module) are: acquaintance with the theoretical and practical problems of assessing soil fertility as the main means of production in agriculture; acquaintance of students with the basics of maintaining a land cadastre and modern methods of assessing soil fertility; methods of soil bonification, land assessment, soil certification.

Learning Outcomes
ON 6 Process and analyze cartographic information obtained during Earth monitoring to ensure the quality, observation of the digital terrain model
ON 7 Perform geodetic work related to the creation of a survey justification for cadastral surveys and the assessment of relief-forming processes, analyze and process geodetic data and assess the characteristics of the relief

Learning outcomes by discipline
1) determine the levels of soil fertility and its components; degree of compliance of soil conditions with the requirements for certain crops; agrotechnical and other methods of improving soil fertility; methods of soil research in the field and laboratory conditions;
2) use large-scale soil, soil-reclamation maps and cartograms for production purposes

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Basic and profile disciplines of the EP

Geodetic support of land works

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline "Geodetic support of land works" is devoted to the study of methods and principles of geodetic support of various land works. Students study the work of conducting geodetic measurements, creating and processing geodetic networks, as well as assessing and controlling the quality of the data obtained. This discipline is key to ensuring the accuracy and reliability of earthworks, ensuring the successful implementation of projects and meeting quality standards

Purpose of studying of the discipline
Obtaining knowledge about the methods and principles of geodetic support for land works and providing the necessary knowledge and skills to effectively perform geodetic measurements and control data quality.

Learning Outcomes
ON 6 Process and analyze cartographic information obtained during Earth monitoring to ensure the quality, observation of the digital terrain model
ON 7 Perform geodetic work related to the creation of a survey justification for cadastral surveys and the assessment of relief-forming processes, analyze and process geodetic data and assess the characteristics of the relief

Learning outcomes by discipline
1) apply knowledge about the methods and principles of geodetic support to perform various land works, including conducting geodetic measurements, creating and processing geodetic networks.
2) evaluate and control the quality of the received geodetic data, as well as take measures to improve them, in order to ensure the accuracy and reliability of land work.
3) demonstrate skills in working with modern geodetic instruments and software, which allows students to effectively use the tools to solve practical problems in the field of land management and construction.

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Basic and profile disciplines of the EP

Environmental Monitoring

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline "Environmental monitoring" is devoted to the study of the concept of environmental safety and sustainable development of the environment. Students study different types and systems of environmental monitoring, their purpose and content, structures, methods of monitoring organization taking into account the characteristics of different types of economic activity; ways of spatial data localization, the essence, specificity, and properties of geo-environmental information, modern geographic information systems.

Purpose of studying of the discipline
The purpose of the study is to give students an understanding of the information system of observations, assessment and prediction of changes in the state of the environment, created to highlight the anthropogenic component of these changes against the background of natural processes

Learning Outcomes

ON 6 Process and analyze cartographic information obtained during Earth monitoring to ensure the quality, observation of the digital terrain model
ON 7 Perform geodetic work related to the creation of a survey justification for cadastral surveys and the assessment of relief-forming processes, analyze and process geodetic data and assess the characteristics of the relief

Learning outcomes by discipline

1) interpret the fundamentals of environmental regulation;
2) demonstrate methods for calculating emissions;
3) use the techniques of environmental expertise

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Basic and profile disciplines of the EP

Geology and Geomorphology

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

Short description of discipline

The discipline "Geology and Geomorphology" is a basic discipline that studies the geological internal structure and magnetism of the Earth, the Earth`s crust and its processes. In the course students will study endogenous, exogenous and metamorphogenetic processes; learn to determine and characterize the morphological and genetic types of terrain, give the main characteristics of the relief; classification of minerals, rocks, their composition and properties.

Purpose of studying of the discipline

Study of the relief of the earth`s surface and the processes that form it. Obtaining knowledge and studying the internal structure of the Earth, endogenous and exogenous morphogenetic processes, geomorphological activity of glaciers and the zoning of glacial complexes of the relief

Learning Outcomes

ON 7 Perform geodetic work related to the creation of a survey justification for cadastral surveys and the assessment of relief-forming processes, analyze and process geodetic data and assess the characteristics of the relief

Learning outcomes by discipline

1) learn about the origin and development of the Earth`s surface relief and the mechanisms of relief formation processes
2) recognize on the ground different forms of the Earth`s surface and the reasons for their formation
3) demonstrate the ability to perform field geological and geomorphological investigations

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination Software in cartography Methods of creation and development of the state geodetic network Geodetic monitoring of engineering buildings and structures

Engineering geology

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

Short description of discipline

The discipline "Engineering Geology" introduces students to the basics of studying the geological structure of the earth`s crust, its influence on engineering structures. Students learn the methods of engineering and geological surveys, which allow assessing the geological conditions of construction and determining the properties of soils. The course also includes the study of basic soil processes and their impact on engineering structures. Knowledge of engineering geology is essential for the safe and efficient design and construction of various engineering facilities.

Purpose of studying of the discipline

The purpose of the discipline "Engineering Geology" is to develop students` skills of analysis and decision-making based on geological information. During the training, students learn to assess the risks associated with geological conditions and soil properties, and apply this knowledge to make informed decisions in the design and construction of engineering facilities.

Learning Outcomes

ON 7 Perform geodetic work related to the creation of a survey justification for cadastral surveys and the assessment of relief-forming processes, analyze and process geodetic data and assess the characteristics of the relief

Learning outcomes by discipline

1. analyze published and stock engineering and geological information;
2. to evaluate the features of engineering and geological conditions in the design, construction and operation of underground structures in various types of rocks and soils;
3. forecasting of hazardous engineering-geological processes and phenomena that determine the degree of complexity and safety of construction works and operating conditions of buildings and structures, including underground.

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination Software in cartography Methods of creation and development of the state geodetic network Geodetic monitoring of engineering buildings and structures

Topographic Mapping

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

Short description of discipline
The discipline "Topographic mapping" is a basic discipline that allows to understand geographical maps and plans, to learn methods of their compilation and proper analysis and their use to solve various geodetic and cartographic problems. During the course, students will learn how to perform a comprehensive description of the territory presented on a map or plan; draw cartographic grids in various projections, plot objects on them.

Purpose of studying of the discipline
Formation of professional competencies necessary for creating and updating topographic maps of land and water areas based on aerial and satellite images, the transformation of which into a cartographic image is based on a field geographical study of the area

Learning Outcomes
ON 4 Demonstrate the ability to draw plans and maps of the terrain using traditional and modern methods
ON 7 Perform geodetic work related to the creation of a survey justification for cadastral surveys and the assessment of relief-forming processes, analyze and process geodetic data and assess the characteristics of the relief

Learning outcomes by discipline
1) describe the state and prospects of development of cartography as a science and branch of practical application; main types of cartographic works and methods of their creation; basics of construction of cartographic images, methods of their transformation; methods of cartographic images and application of conventional symbols on maps;
2) classify cartographic images; select a cartographic base for creating thematic maps; make cartometric calculations on maps
3) demonstrate the ability to draw and design fragments of thematic plans and maps; techniques of cartometric calculations; use of maps to systematize territorial information

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Final examination Software in cartography Methods of creation and development of the state geodetic network Geodetic monitoring of engineering buildings and structures

Fundamentals of industrial construction

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

Short description of discipline
The discipline "Fundamentals of industrial construction" is a basic discipline that studies the basic concepts of the design of an industrial building and construction in general, the master plan of these projects, technical and economic indicators. The discipline examines the issues of building materials and sanitary equipment, compliance with the requirements of health standards and regulations. During the study the student will get acquainted with modern technologies of erection, methods of design of industrial enterprises; recommendations on the selection, application of the most effective building materials.

Purpose of studying of the discipline
It is aimed at studying the creation of various structures for industrial and industrial purposes (for example, factories and factories).

Learning Outcomes
ON 9 Make geodetic measurements related to solving typical construction tasks

Learning outcomes by discipline
1) determine the main stages of design and construction
2) apply normative documents and standards in their activities
3) demonstrate skills in understanding modern methods of design and construction of buildings and open areas, taking into account the requirements of regulatory documents and standard solutions of modern construction

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Software in cartography Methods of creation and development of the state geodetic network Geodetic monitoring of engineering buildings and structures

Building Technology Design

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

Short description of discipline
The discipline "Building Technology Design" is a basic discipline, considered a special part of construction, studying methods and technologies of building design, responding to market requirements and meeting quality standards. The discipline deals with the feasibility study and allows you to choose the right scheme of the building, will allow you to argue the calculation of sections, to prove the strength and reliability of the building in the process of operation under any conditions.

Purpose of studying of the discipline
the formation of students` professional abilities in technical, organizational, managerial decisions that allow them to comprehensively solve the problems of building design.

Learning Outcomes
ON 9 Make geodetic measurements related to solving typical construction tasks
Learning outcomes by discipline
1) learn building design methods
2) determine the technology of building design
3) argue schemes and calculations of sections that meet quality requirements
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Software in cartography Methods of creation and development of the state geodetic network Geodetic monitoring of engineering buildings and structures

Technology of construction production

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

Short description of discipline
The discipline "Technology of construction production" is a basic discipline that studies the theoretical foundations, methods of execution of certain processes, routines of execution of construction processes preceding the study of the main concepts and regulations of construction and geodesic products for the solution of construction and geodesic tasks. The aim of the discipline is to form knowledge and skills in the field of technological design of construction processes, organization of transportation of construction cargoes, organization of processes and works.
Purpose of studying of the discipline
The purpose of the discipline is to study the methods of performing construction processes that ensure the processing of building materials, semi-finished products and structures with a qualitative change in their condition, physical and chemical properties, geometric dimensions in order to obtain construction products of a given quality.
Learning Outcomes
ON 9 Make geodetic measurements related to solving typical construction tasks
Learning outcomes by discipline
1) Plan the organization and technology of construction of buildings and structures
2) Recognize the basic provisions and tasks of building production; types of peculiarities of building processes and works
3) Demonstrate knowledge of theoretical fundamentals of organization and planning in construction production
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Software in cartography Methods of creation and development of the state geodetic network Geodetic monitoring of engineering buildings and structures