Mining and Metallurgical Institute named after O.A. Baikonurov
«Mine Surveying and Geodesy» department

EDUCATIONAL PROGRAM

6B07310 - «Land management and cadastre»

Code and classification of the field of education: **6B07 Engineering Manufacturing and Civil engineering**
Code and classification of training directions**: 6B073 Architecture and Civil engineering**
Group of educational programs: **B075 Cadastre and land Management**
Level based on NQF: 6
Level based on IQF: 6
Study period: 4 years
Amount of credits: 240

Almaty 2025

Educational program 6B07310 – «Land management and cadastre» was approved at a meeting of the Academic Council of KazNRTU named after K.I.Satbayev.
Protocol №6 of 6.03.2025
Considered and recommended for approval at a meeting of the Educational and Methodological Council of KazNRTU named after K.I.Satbayev.
Protocol №2 of 20.12.2024

Educational program 6B07310 – «Land management and cadastre» developed by the academic committee in the direction of «Architecture and Civil engineering»

Full name	Academic degree/ academic title	Position	Place of work	Signature
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Employer:				
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List of abbreviations and symbols

Reduction	Full name
SU	Satbayev University
MSHE RK	Ministry of Science and Higher Education of the Republic of Kazakhstan
AS	Academic staff
EP	Educational program
WC	Working curriculum
GIS	Geographic information system
LOED	Learning outcomes of the educational program
BD	Basic discipline
PD	Profile discipline
TUC	The university component
CC	Component of choice
SDG	Sustainable Development Goals
TUN	The United Nations

The educational program "Land Management and Cadastre" contributes to the achievement of the priority Sustainable Development Goals (SDGs) approved by the United Nations through the training of competitive specialists with modern knowledge and practical skills in the field of land management, cadastre, land monitoring, economic assessment of real estate and management of territorial resources. The program is aimed at developing professional competencies in the field of rational land use, regulatory and legal regulation, spatial analysis and design, contributing to the sustainable development of cities and rural areas, environmental sustainability, openness and security of infrastructure. Special attention is paid to the training of specialists who are able to adapt to rapidly changing technological and legal conditions, effectively use modern geoinformation technologies, as well as participate in research activities and international projects. Graduates of the educational program "Land Management and Cadastre" contribute to the digitalization of the land management and cadastral sphere, participate in the development and implementation of projects on sustainable land management, improving the efficiency of cadastral registration and spatial planning. Their activities are aimed at implementing national and global initiatives in the field of sustainable development of territories, modernization of land relations and improvement of the quality of life of the population.

The program contributes to the achievement of the following Sustainable Development Goals:

SDG 4. Quality education is the formation of a sustainable system of high-quality, inclusive and affordable education that provides lifelong learning opportunities

SDG 9. Industrialization, innovation and infrastructure - the development of sustainable infrastructure and the introduction of scientific and technological innovations into the economy of the region and the country.

SDG 12. Responsible consumption and production is the development of a

system of environmentally responsible consumption and production based on the principles of reduction, reuse and recycling.

SDG 13. Combating climate change – using geospatial technologies to monitor changes in the environment;

SDG 15. Conservation of terrestrial ecosystems is the monitoring and assessment of land use aimed at protecting and restoring natural ecosystems.

1. Description of the educational program

The educational program "Land Management and Cadaster" is the first level qualification of the three levels of the higher education system. Due to the qualification module and the final qualifying work of the bachelors of the educational program.

2. The purpose and objectives of the educational program

Goal EP: the purpose of the educational program is to prepare the graduate as a competitive specialist in the field of land management and cadaster, with critical thinking, able to use theoretical and practical information to perform land management and cadastral works in the field of monitoring of land and real estate, cadastral and economic assessment of land and other real estate, regulatory framework in the development of projects.

Tasks EP:

Task 1: preparation of the graduate for organizational activities that exclude negative phenomena in professional activity, development of spiritual values, moral and ethical norms of the individual as a member of society, implementation of the legal and legislative system of the Republic of Kazakhstan with a high level of professional culture, citizenship;

Task 2: preparation of graduates for continuous self-improvement and self-development, mastering new knowledge, skills and abilities in innovative areas of geodesy and cartography;

Task 3: preparation of a graduate with the acquired competencies to perform calculations in the field of land management and cadastre, design technical solutions, participate in the development of technical specifications for topographic and geodetic, aerospace, cartographic work in the area to solve land management based on a modern educational base of the material and technical base;

Task 4: preparation of a graduate, based on the diversity and dynamism of the catalog of elective disciplines of the curriculum, with a predominance of practical skills in competencies, who is able to perform professional functions within one or more types of activities based on the final results of training, taking into account the specifics of these types of activities, market requirements for organizational and managerial, professional competencies;

Task 5: preparation of a graduate as a competitive specialist in the field of land management and cadastre, including on the basis of an increase in the international aspect in educational, scientific programs, competent in the field of

advanced land management technologies and cadastre implementation, and registration of scientific research results.

3. Requirements for the evaluation of learning outcomes of the educational program

Learning outcomes include knowledge, skills and competencies and are defined both for the educational program as a whole and for its individual modules, disciplines or tasks.

The main task at this stage is to select assessment methods and tools for all types of control, with the help of which it is possible to most effectively assess the achievement of planned learning outcomes at the discipline level.

4.Passport of the educational

4.1. General information

№	Field name	Note
1	Code and classification of the field of education	B074 Urban planning, construction work and civil engineering
2	Code and classification of training directions	6B073 Architecture and civil engineering
3	Educational program group	Urban planning, construction works and civil engineering
4	Educational program name	6B07310- Land management and cadaster
5	Short description of educational program	Educational program «Land management and cadaster » – it is a first level qualification of the three levels of the higher education system.
6	Purpose of EP	The purpose of the educational program is to prepare the graduate as a competitive specialist in the field of land management and cadastre, with critical thinking, able to use theoretical and practical information to perform land management and cadastral works in the field of monitoring of land and real estate, cadastral and economic assessment of land and other real estate, regulatory framework in the development of projects
7	Type of EP	New EP
8	The level based on NQF	6
9	The level based on IQF	6
10	Distinctive features of EP	No
11	List of competencies of educational program	**General cultural competencies (GCC)** **GCC-1.** Ability to communicate effectively in Russian, Kazakh and a foreign language in a professional environment in the field of land management and cadastre.

		GCC-2. Ability to work in a team and interact with cadastral engineers, specialists in related industries, local governments and government agencies. **GCC-3.** Critical and systematic thinking, the ability to make informed decisions in non-standard situations, legal and environmental aspects. **GCC-4.** Self-organization and time management skills, the ability to plan professional activities and achieve goals in conditions of limited resources. **General Professional Competencies (GPC)** **GPC-1.** Knowledge of the regulatory framework in the field of land management, cadastre, land relations and real estate valuation. **GPC-2.** Knowledge of methods of topographic, geodetic and cadastral measurements, registration of technical documentation. **GPC-3.** Skills in collecting, analyzing, interpreting, and visualizing spatial information for the needs of land management and cadastre. **GPC-4.** The ability to carry out inventory, monitoring and economic assessment of lands and other real estate objects. **GPC-5.** Understanding the fundamentals of land use design, territorial planning and sustainable development of territories. **Professional Competencies (PC)** **PC-1.** Carrying out land management, cadastral, geodetic and cartographic works at all stages — from survey to state registration. **PC-2.** Development of land management and cadastral documentation, including projects of land surveying, land management and planning of territories. **PC-3.** Carrying out cadastral surveys, defining the boundaries of land plots, registration of cadastral passports and plans. **PC-4.** Conducting spatial analysis, economic and legal assessment of real estate objects using geoinformation data. **PC-5.** Participation in the preparation and implementation of projects for sustainable land use, agrarian reform and territorial administration. **PC-6.** Development and registration of project and accounting documentation, participation in research activities in the field of land management and cadastre. **Digital Competencies (DC)** **DC-1.** Knowledge of specialized programs and GIS systems (ArcGIS, QGIS, MapInfo, AutoCAD, Credo, Panorama, etc.) for spatial data processing. **DC-2.** Ability to work with digital terrain models, GNSS data, remote sensing and aerial photography

		results. **DC-3**. Knowledge of the principles of spatial data storage, processing and analysis using databases and geoportals. **DC-4.** Using cloud solutions, Web-GIS, and online platforms for collaboration, exchange, and visualization of cadastral and geographic information.
12	Learning outcomes of educational program	1.Analyze the theory and practice of entrepreneurship as a system of economic, organizational and legal relations of business structures. Apply professional ethical standards, master the techniques of professional communication. Be able to work in a team, tolerantly perceiving social, ethnic, confessional and cultural differences. 2.Apply the basics of mathematical knowledge in various fields of activity, apply the theory of partial differential equations to solve and study applied problems, form ideas about the implementation of numerical methods for solving boundary value problems using Matlab. 3.Use practical skills in creating and updating digital topographic bases, plans and maps using software, analyze methods of creating digital and electronic maps, as well as automation of cartographic work. Apply the technology of creating digital topographic maps containing logical and mathematical descriptions of mapped objects and the relationship of terrain objects in the form of their combinations, intersections and neighborhood. 4.Apply professional knowledge to minimize negative production factors when conducting land management work, analyze the regulatory framework for labor protection, environmental factors and their classification, chemical laws in professional activities 5.To instill the ability to acquire new knowledge in the field of spatial planning and forecasting of land resources using modern educational and information technologies, geographic information systems (GIS), remote sensing of the Earth and specialized language programs for working with international scientific and technical sources. 6.Master the methods of land and real estate management. Organize and conduct cadastral and land surveying work, including the determination of land boundaries using modern surveying equipment. Carry out spatial planning of settlements. To be able to carry out state registration and land records, to draw up an annual statistical report on the condition of land. 7.Apply remote sensing data of the Earth when solving cadastral and land management tasks; perform aerial

		photography of land plots using unmanned aerial vehicles; apply GIS technologies when creating cadastral and soil maps, digital models of terrain and objects. 8.Perform classification and diagnostics of soils, assessment of the main types of soils according to morphological, chemical and physico-mechanical characteristics. Know the factors of soil fertility deterioration and methods of their elimination, land reclamation and soil protection. Possess methods of soil assessment, calculation of the bonus score and compilation of soil maps using GIS technologies 9.Explain the basic laws of the territorial physical and geographical differentiation of the geographical envelope, the properties of the natural landscape and its structures, natural and anthropogenic factors that determine the functioning and development of landscapes. Classify natural and anthropogenic landscapes, design landscape maps and maps of physical and geographical zoning using aerospace survey data. 10.Apply modern geodetic equipment, ground-based and satellite positioning technologies to determine the boundaries of land plots and create cadastral plans 11.Apply GIS technologies to solve land cadastre tasks, including performing cadastral registration in a GIS environment and spatial fixing of land plots 12.To control the observance of the land legislation of the Republic of Kazakhstan by state bodies, individuals, legal entities and officials. To interpret the rules of using land plots, keeping land cadastre and land management, implementation of measures on rational use, state monitoring and protection of lands. 13.Perform angular and linear measurements on the ground to create topographic maps and plans of various scales, planning and high-altitude justification of large-scale surveys for the design of engineering structures, mathematical processing and evaluation of measurement accuracy, carry out verification and alignment of geodetic instruments, perform survey and center using modern geodetic equipment; extract geographical information from the cartographic image; transform geographical information in a cartographic view. 14.Analyze and use information about chemical and physical properties of the most important inorganic, organic substances, basic information about the theory of substance structure, the doctrine of solutions, information about the laws of organic synthesis, the basics of physical and chemical analysis of substances

		to understand the theoretical foundations of soil science and soil evaluation. 15.Use the regulatory framework of cadastral land assessment; demonstrate methods of zoning the territories of cities and rural settlements; perform state cadastral land assessment. Interpret the cadastral and market value of the land plot and the results of their examination. Determination of economic efficiency, preparation of budget documentation.
13	Education form	Full-time
14	Period of training	4 years
15	Amount of credits	240
16	Languages of instruction	Russian, Kazakh
17	Academic degree awarded	Bachelor of engineering and technology
18	Developers and authors	Department MSaG

4.2. The relationship between the achievability of the formed learning outcomes in the educational program and academic disciplines

№	Name of the discipline	Brief description of the discipline	Number of credits	Formed learning outcomes (codes)													
				LR1	LR2	LR3	LR4	LR5	LR 6	LR 7	LR 8	LR9	LR10	LR11	LR12	LR13	LR14	LR15
Cycle of general education disciplines Selectable Component																		
1	Foreign language	English is a compulsary subject. According to the results of placement test or IELTS score, students are placed into groups and disciplines. The name of the discipline corresponds to the level of English. When passing from level to level, prerequisites and postrequisites are respected.	5	v														
2	Kazakh (russian) language	Kazakh (Russian) language In this course author considers socio-political, socio-cultural spheres of communication and functional styles of the modern kazakh (russian) language. The course covers the specifics of the scientific style to develop and activate professional communication skills and abilities of students. Also it allows students to leavn the basics of scientific style practically and develop the ability of production structural and semantic text analysis.	5	v														
3	Physical culture	The purpose of the discipline is to master	8	v														

		the forms and methods of forming a healthy lifestyle within the framework of the professional education system. Familiarization with the natural-scientific basics of physical education, knowledge of modern health-improving technologies, basic methods of independent physical education and sports. As part of the course, the student will master the rules of judging in all sports.																	
4	Information and communication technology	The aim of the course is to gain theoretical knowledge in information processing, the latest information technologies, local and global networks, the methods of information protection; Getting the right use of text editor editors and tabulators; creation of base and different categories of applications.	5				**v**												
5	History of Kazakhstan	The purpose of the discipline is to provide objective historical knowledge about the main stages of the history of Kazakhstan from ancient times to the present day; introduce students to the problems of the formation and development of statehood and historical and cultural processes; contribute to the formation of humanistic values and patriotic feelings in the student; teach the student to use the acquired historical knowledge in educational, professional and everyday life; evaluate the role of Kazakhstan in world history.	5		**v**														
6	Philosophy	The purpose of the discipline is to teach	5				**v**												

		students the theoretical foundations of philosophy as a way of knowing and spiritually mastering the world; developing their interest in fundamental knowledge, stimulating the need for philosophical assessments of historical events and facts of reality, assimilating the idea of the unity of the world historical and cultural process while recognizing the diversity of their skills in applying philosophical and general scientific methods in professional activities.																
7	Module of socio-political knowledge (sociology, political science)	The objectives of the disciplines are to provide students with explanations on the sociological analysis of society, about social communities and personality, factors and patterns of social development, forms of interaction, types and directions of social processes, forms of regulation of social behavior, as well as primary political knowledge that will serve as a theoretical basis for understanding social -political processes, for the formation of political culture, development of a personal position and a clearer understanding of the extent of one's responsibility; help to master the political, legal, moral, ethical and socio-cultural norms necessary to act in the interests of society, form personal responsibility and achieve personal success.	3				**v**												
8	Module of socio-political	The purpose of the disciplines is to study	5			**v**													

	knowledge (cultural studies, psychology)	the real processes of cultural creative activity of people who create material and spiritual values, identify the main trends and patterns of cultural development, changes in cultural eras, methods and styles, their role in the formation of man and the development of society, as well as master psychological knowledge for the effective organization of interpersonal interaction, social adaptation in the field of their professional activities.																
Cycle of general education disciplines Component of choice																			
9	Fundamentals of anti-corruption culture and law	To increase the public and individual legal awareness and legal culture of students, as well as the formation of a knowledge system and a civic position on combating corruption as an antisocial phenomenon. Improvement of socio-economic relations of the Kazakh society, psychological features of corrupt behavior, formation of an anti-corruption culture, legal responsibility for acts of corruption in various fields.	5		v		v												
10	Fundamentals of economics and entrepreneurship	To develop basic knowledge of economic processes and skills in entrepreneurial activities. The course aims to develop skills in analyzing economic concepts such as supply and demand, and market equilibrium. It includes the basics of creating and managing a business, developing business plans, risk assessment, and strategic decision-	5	v	v	v													

		making.																	
11	Ecology and life safety	Formation of ecological knowledge and consciousness, obtaining theoretical and practical knowledge on modern methods of rational use of natural resources and environmental protection. The study of the tasks of ecology as a science, the laws of the functioning of natural systems and aspects of environmental safety in working conditions, environmental monitoring and management in the field of its safety, ways to solve environmental problems; life safety in the technosphere, emergencies of a natural and man-made nature.	5	v	v	v													
12	Fundamentals of scientific research methods	The purpose of the discipline "Fundamentals of scientific research methods" is to develop students' skills and abilities in the field of scientific cognition methodology. A brief description of the discipline. Methodological foundations of scientific knowledge. The concept of scientific knowledge. Methods of theoretical and empirical research. Choosing the direction of scientific research. Stages of scientific research work. The research topic and its relevance. Classification, types and objectives of the experiment. Metrological support of experimental research. A computational experiment. Methods of processing experimental results. Registration of the research	5	v	v	v													

		results. Presentation of a research paper.																	
13	Fundamentals of financial literacy	Using in practice all possible tools in the field of financial management, saving and increasing savings, competent budget planning, obtaining practical skills in calculating and paying taxes and correctly completing tax reports, analyzing financial information and navigating financial products to choose an adequate investment strategy	5																
Cycle of basic disciplines University component																			
14	Mathematics	The purpose of mastering the discipline is to form the theoretical and practical foundations of mathematics and its applications. On the basis of studying the mathematics section, to give students the development of thinking and the achievement of mathematical culture, which is necessary for application in future professional activities. The course is based on the study of mathematical analysis in a volume that allows you to study elementary functions and solve the simplest geometric, physical and other applied problems. The main focus is on differential and integral calculus. The course sections include the differential calculus of functions of one variable, the derivative and differentials, the study of the behavior of functions, complex numbers, and polynomials. Indefinite integrals, their properties and methods of	5						**v**										

		calculation. Certain integrals and their applications. Improper integrals.																
15	Physics	Purpose:To form ideas about the modern physical picture of the world and scientific worldview, the ability to use knowledge of fundamental laws, theories of classical and modern physics. Contents_ physical fundamentals of mechanics, fundamentals of molecular physics and thermodynamics, electricity and magnetism, vibrations and waves, optics and fundamentals of quantum physics.	5						v									
16	Geodetic instruments	Of studying of discipline "Geodezicheskoe instrumentology" is the study of the design and technical features optical and mechanical surveying instruments, evaluate the accuracy of the instrument. The study of the full cycle (podgotovka, working and receiving data) work with geodetic instruments. Device and principle of operation of geodetic tools. Definition of precision, detection and komentiranje factors influencing the measurement accuracy. Segments and types of modern GNSS receivers. Types of modern tools, their similarities and differences principially.	5												v	v			
17	Geodesy	He will master the basic concepts of the Shape and size of the Earth, about coordinate systems used in geodesy, about the orientation of lines on the terrain, about plans, maps, profiles, about	6								v	v	v					

		scale, terrain relief, about angular and linear measurements, about altitude measurements, about methods and measurements of topographic surveys, about the accuracy of geodetic measurements, the use of geodetic instruments, as well as cameral processing of the geodetic measurements obtained.																
18	Geoinformatics	Formation of a complex of knowledge in the field of using GIS, when creating digital models, acquiring knowledge and skills in using modern GIS in various types of professional and social activities. Master the methods of creating topographic maps and plans using GIS technology, the principles of creating databases, gain skills in creating GIS using materials from aerospace and ground surveys.	5				**v**						**v**					
19	Chemistry	Laws, theoretical principles and conclusions that underlie chemical disciplines; properties and relationships of chemical elements based on D.I. Mendeleev's periodic law and modern ideas about the structure of matter; fundamentals of chemical thermodynamics and kinetics; processes in solutions; structure of complex compounds.	5											**v**	**v**			**v**
20	Theoretical Foundations of land management and cadastre	The study of the discipline consists in the formation of competencies in the tasks of rational use of land and protection, classification of land by suitability. The	5								**v**	**v**	**v**					

		basics of land management, the functions and role of land as a means of production, accounting and economic condition of land, land distribution in the Land Fund of the Republic of Kazakhstan, types of land management tasks and design will be studied. Students will know the principles of territorial organization of production and distribution of land by land.																
21	Fundamentals of electronics and electrical engineering	"Fundamentals of electrical engineering and electronics" studies the units of measurement of current strength, voltage, electric current power, conductor resistance; methods for calculating and measuring the main parameters of simple electrical, magnetic and electronic circuits; properties of direct and alternating electric current; principles of serial and parallel connection of conductors and current sources; electrical measuring instruments (ammeter, voltmeter), their device, principle of operation and rules for inclusion in an electrical circuit; properties of the magnetic field; motors of direct and alternating current, their device and principle of operation; rules for starting and stopping electric motors installed on equipment in operation.	4															
22	Land management control	To master knowledge about land resources for the organization of rational use of land and the definition of measures to reduce anthropogenic impact on the	5								**v**	**v**	**v**					

		territory. To learn how to apply knowledge of the laws of the country for the legal regulation of land and property relations and the implementation of control over the use of land and real estate. To use knowledge for the management of land resources and real estate, as well as in the organization and conduct of cadastral and land management works..																	
23	Engineering and computer graphics	To develop students' knowledge of drawing construction and skills in developing graphical and textual design documentation in accordance with standards. Students will study ESKD standards, graphic primitives, geometric constructions, methods and properties of orthogonal projection, Monge's projection, axonometric projections, metric tasks, types and features of connections, creating part sketches and assembly drawings, detailing, and creating complex 3D solid objects in AutoCAD.	5													v		v	
24	Cartography	To study the mathematical basis of maps and types of cartographic projections. Be able to choose and justify the scale, recognize the map projection. Examine the distortions on the maps. To master the cartographic methods of depicting the relief. To study the main sources for compiling thematic and general	5						v										

		geographical maps. Master the basic methods of creating maps in ArcGIS.																	
25	Monitoring of land	The purpose of studying the discipline is the theoretical development of the meaning and role of urban land monitoring in the field of land and natural resources management, land management and cadastral works, interaction of information systems of land cadastre and land monitoring and includes the following sections: characteristics of urban lands and their features as an object of assessment and monitoring; basic methods of monitoring urban lands; organization of observations monitoring the condition and use of the land fund; remote land monitoring methods; the use of remote sensing data for urban land planning.	5					v							v		v
26	Geodetic work in land management	The purpose of teaching the discipline is to teach students the methods and techniques of calculating areas and designing land plots, transferring them to nature, solving geodetic tasks of performing calculations and determining coordinates for transferring land management projects to the terrain.	5													v	v	v
27	Water resources management	The purpose of teaching the discipline is to train specialists in the field of environmental management and water use with in-depth knowledge of the basics of water resources management. The main tasks in studying the discipline are: - a deep understanding of the peculiarities	5							v	v	v						

		of water resources management and water management complexes within the Republic of Kazakhstan; - to gain knowledge about existing systems of regulation and management of water resources; - have an idea of the organization of the structure of departments involved in solving problems of water bodies, regulating issues of their optimization and restoration, controlling water quality; - gain skills in assessing water management activities in the territory.																	
28	Land reclamation	To master theoretical and practical knowledge in the field of regulation of water and related air, food, thermal and salt regimes of soils in combination with appropriate agricultural techniques and landscape features, as well as methods for creating and maintaining optimal conditions in the soil system – plant" to increase the stability of agricultural production and environmental sustainability of agro-reclamation landscapes, prevent water and wind erosion of soils and reclamation of man-made landscapes.To master theoretical knowledge in the field of regulation of water and related air, food, thermal and salt regimes of soils in combination with appropriate agricultural techniques and landscape features. To study methods for creating and maintaining optimal conditions in the soil–plant system to	5											**v**		**v**		

		increase the stability of agricultural production and environmental sustainability of agro-reclamation landscapes, as well as to prevent water and wind erosion of soils and reclamation of man-made landscapes.																	
29	Topographical graphics	The discipline studies the theory and methods of graphic design of cartographic materials used in cartography, geodesy, land management, as well as the use of a graphic software package (CorelDRAW, AutoCAD, etc.). It also includes theoretical knowledge and practical skills in creating a topographic map, a land management plan, compiling and editing, preparing for publication and publishing maps, drawing and design work, for which it is necessary not only to know the materials, drawing accessories and also to combine the methods and techniques of drawing and designing maps.	3									v				v		
30	Landscape science	To master the structural elements of the landscape shell and the principles of its systemic organization, the natural geographical components of landscapes (geosystems), their unity, interrelationships and interdependencies. To study the main methods of landscape research and the features of the organization of complex geographical research; criteria for assessing territorial environmental situations, the systematics of landscapes and types of landscapes of	5						v										

		the Earth. To know the factors, mechanisms and history of the formation of anthropogenic landscapes, as well as the principles of anthropogenic compatibility.																	
31	Remediation and protection of lands from erosion	To master basic knowledge for solving theoretical and practical professional tasks in the field of land reclamation and reclamation; to find the right solutions for the prevention, detection and elimination of violations of land use and protection, land and water legislation; to develop technical specifications for the design of land reclamation and reclamation works; to develop projects for the organization of territory for engineering and reclamation of the territory.	5						**c**										
32	Digital mapping	Purpose: Get theoretical knowledge and practical skills in using software for creating and updating digital cadastral plans and maps. Contents: To study methods for creating digital and electronic maps, as well as automation of cartographic support for land management work. To master the technology of creating digital topographic maps containing logical and mathematical descriptions of mapped objects and the relationship of terrain objects in the form of their combinations, intersections and neighborhoods.	5																
33	Land management and planning of settlements	Purpose: To master theoretical knowledge and practical skills in the field	6																

		of drafting projects and plans for land management and planning of populated areas and to master the methodology of their development. To study the basic provisions on territorial planning and master the architectural, planning and spatial organization of populated areas. Analyze the problem of rational use of land and establishment of boundaries of rural settlements.																	
34	Spatial planning, forecasting of land resources	Purpose: the use of land resources, methods of planning and forecasting in the use of resources, mastering the basics of automated planning and forecasting of new information technologies, measures to implement land legislation aimed at regulating land relations and organizing the full and rational use and protection of land. Ensuring the rational use of land resources through spatial planning and forecasting, contributing to the sustainable development of territories, preventing land degradation and effective management of natural resources.																	
Cycle of basic disciplines Selectable Component																			
35	Pedology	To master the basic genetic features of the formation of the earth's soil cover, soil classification, knowledge of soil diagnostics and modern concepts about the concepts of soil landscapes, assessment of the main types of soils according to their agrotechnical	5								**v**				**v**			

		characteristics, taking into account the peculiarities of their use and factors contributing to soil salinization. The ability to diagnose the soil according to its main characteristics and characteristic of each soil and climatic zone.																
36	Soil assessment	To gain theoretical knowledge and practical skills in determining and evaluating soils by morphological, chemical, and physico-mechanical characteristics. To study the spatial features of soil distribution and the degree of their influence on soil quality and productivity, factors of soil fertility deterioration and methods of their elimination, land reclamation and soil protection. To master the methods of soil assessment, calculation of the bonus score and preparation of soil maps.	5						**v**					**v**				
37	Engineering development of the territory	The purpose of studying the discipline is to provide professional education that promotes social, academic mobility, demand in the labor market, a successful career, work in public institutions that solve the problems of engineering development of the territory. Providing the bachelor with the knowledge and skills necessary to participate in the development of new design techniques, technologies for the engineering arrangement of the territory.	5															
38	Land law	To master knowledge in the field of legal regulation of land relations. Students will know the specifics of the processes of	5						**v**					**v**				

		forming the system of the legal basis of land management and cadastre, the legislative framework of land relations with respect to real estate. They will get acquainted with the issues of the legal cadastre, the principles of the right to land, real estate, methods of legal regulation of land and property relations in accordance with the legislation of the Republic of Kazakhstan.																	
39	Fundamentals of sustainable development and ESG projects in Kazakhstan	The goal is for students to master the theoretical foundations and practical skills in the field of sustainable development and ESG, as well as to develop an understanding of the role of these aspects in the modern economic and social development of Kazakhstan. introduces the principles of sustainable development and the implementation of ESG practices in Kazakhstan, includes the study of national and international standards, analysis of successful ESG projects and strategies for their implementation in enterprises and organizations.	5																
40	Legal regulation of intellectual property	The goal is to form a holistic understanding of the system of legal regulation of intellectual property, including basic principles, mechanisms for protecting intellectual property rights and features of their implementation. The discipline covers the basics of IP law, including copyright, patents, trademarks, and industrial designs. Students learn	5																

		how to protect and manage intellectual property rights, and consider legal disputes and methods for resolving them.																	
41	ESG Principles in inclusive culture	Course objective: This course focuses on the study of the principles of ESG (Environmental, Social, Governance) and their interaction with the creation of an inclusive culture in the organization. Content: Students will gain knowledge about how the implementation of ERP principles contributes to business social responsibility, sustainable development and equal opportunities for all employees, including those who may face various types of discrimination. The course will help students understand the importance of an inclusive culture for achieving long-term business goals and sustainable development of an organization.	4								v	v	v					
42	Landscape Design	To master the structural elements of the landscape shell and the principles of its systemic organization, the natural geographical components of landscapes (geosystems), their unity, interrelationships and interdependencies. To study the main methods of landscape research and the specifics of the organization of complex geographical research; criteria for assessing territorial ecological situations, landscape systematics and types of landscapes of the Earth. Know the factors, mechanisms and history of the formation of	5						v									v	

		anthropogenic landscapes, as well as the principles of anthropogenic compatibility.																	
43	Web-GIS basics	The discipline is focused on the formation of ideas and understandings about the concepts and technical foundations of web GIS, architecture and components of web GIS, thin and thick clients, types and functions of geospatial web services, optimization of web services, SDI in the web era, solving applied problems with using ArcGIS online and QGIS online. Creation of interactive online maps, “story maps” for solving problems in the field of geodesy, cartography, mine surveying.	5																v
44	Web-cartography	The concepts of map creation and map material design in a Web-oriented environment will be studied. The discipline is an alternative discipline to «Web-GIS basics». Gain skills in the use of the basics of computer networks and their mechanisms, and analyze the principles of GIS servers and JavaScript. Master the systems and algorithms of web architecture, in order to design and create interactive maps and web applications in the tasks of land management and cadastre.	5														v		v
45	Management of land surveying and cadastral works	To study the features of cadastral activity management in market conditions, the basics of economic regulation of activities and the economic aspects of	5													v		v	

		creating a new cadastral enterprise. Know the basic requirements of civil and administrative legislation in relation to land cadastre activities. To master the methodology of drawing up a business plan for the organization of land management and cadastral enterprises. Master the methodology of planning and organizing cadastral works, as well as be able to perform calculations to optimize land management and cadastral works.																	
Cycle of major disciplines University component																			
46	Basics of the cadastre	The purpose is to systematize and record information about real estate in a certain territory, create a unified database of land plots and real estate objects, their owners, restrictions and encumbrances. To master the procedure for conducting cadastral activities that allow you to fill out basic land cadastre documents. To study the regulatory framework, legal acts regulating the processes of cadastral activity	5																
47	Organization and planning of land cadastral works	To master the regulation of land relations and land use rights, calculation of the volume of land management works and drawing up the personnel balance; structuring the land resources system; creation of land management groups; payroll; calculation of labor income. To study the management of land management and cadastral works, cost	5														**v**	**v**		**v**

		estimates, cost calculation and acceptance of works, as well as accounting and monthly reporting on the amount of work performed.																	
48	Remote sensing of the earth	The purpose of the discipline is to master the methods of processing and analyzing satellite imagery data in solving cartographic, geodetic and environmental problems. Students will be able to understand the results of remote sensing of the Earth, use modern sensors operating in active and passive modes. They will master satellite imagery processing technology, including image enhancement and image interpretation methods, and learn how to select remote sensing data processing methods for solving geological and environmental problems.	6												v	v			v
49	Photogrammetry	To study the basics of the technology of modern photogrammetric processes, including methods for performing aerial surveys, their cameral processing, and analysis of the accuracy of the obtained materials, as well as methods for using them to create and update topographic maps and cadastral plans. Apply modern technologies and software products in solving land management and cadastral tasks, as well as perform the optimal choice of satellite imagery materials and their integration into GIS programs when creating cadastral maps.	5														v	v	v

50	Cadastral zoning, land valuation and taxation	To study the regulatory framework for cadastral valuation of land, to get an idea of zoning and taxation of land. To master the methods of zoning the territories of cities and rural settlements for the functional use of land. To master the issues of the organization of the state cadastral valuation of lands. Get an idea of the cadastral and market value of a land plot, the results and expertise of the cadastral value of land. To study the issues of dispute resolution on the results of determining the cadastral value of land.	5							v					v			
51	State registration and accounting of lands	To study the basics of registration of ownership rights to real estate and transactions with it, patterns and prospects for the development of the unified accounting and registration system of the Republic of Kazakhstan. Be able to analyze legal relations and regulatory legal acts in the field of registration of rights and accounting of real estate, interpret and apply these acts; solve practical problems by applying regulatory legal acts in the field of accounting and registration actions. Have the skills to work with legal acts.	5								v	v	v					
52	Automated technologies of cadastral works	The purpose of the course is to form students' knowledge about modern automated land information systems. After completing the course, the student must know the regulatory framework for regulating land relations of the Republic	5													v	v	

		of Kazakhstan, the structure of land management and cadastral institutions, the processes of processing and integrating cadastral data between structural units, as well as be able to use modern automated GIS systems to solve cadastral problems.																	
53	Land Use Planning	Acquire theoretical knowledge and practical skills that allow you to master the methodology of land management design. To study the principles of land management, classification and content of land management projects. To know the assessment of the economic efficiency of design solutions, ways of organizing land use and land ownership, features of designing land holdings for various purposes. To master the principles of land management design, taking into account the conditions of different territories.	5															**v**	**v**
54	Urban infrastructure design	Goal. The study of methods and principles of designing urban infrastructure, including transport, communal and social infrastructure, taking into account modern trends, technologies and sustainable development. Formation of skills in developing effective, environmentally friendly and comfortable solutions for the city. Fundamentals of urban infrastructure design, classification and functional characteristics of urban infrastructure facilities, methods of	5																

		designing transport and engineering systems, principles of sustainable urban development, modern technologies in design, integration of environmental and social factors into urban infrastructure design.																	
55	Urban planning and planning of land and cadastral works	The purpose of this includes studying the principles and methods of planning, designing and accounting for the use of land resources, as well as interaction with legislative and regulatory acts in the field of urban planning and land cadastre. The main focus is on ensuring the sustainable development of urban areas, improving the quality of life and efficient use of land resources within the framework of legal and environmental standards.	6																

5. Curriculum of the educational program

NON-PROFIT JOINT STOCK COMPANY
"KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY NAMED AFTER K.I. SATBAYEV"

SATBAYEV UNIVERSITY

«APPROVED»
Decision of the Academic Council
NPJSC«KazNRTU
named after K.Satbayev»
dated 06.03.2025 Minutes № 10

WORKING CURRICULUM

Academic year	2025-2026 (Autumn, Spring)
Group of educational programs	B075 - "Inventory and land management"
Educational program	6B07310 - "Land management and cadastre"
The awarded academic degree	Bachelor of engineering and technology
Form and duration of study	full time - 4 years

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	lek/lab/pr Contact hours	in hours SIS (including TSIS)	Form of control	Allocation of face-to-face training based on courses and semesters								Prerequisites
									1 course		2 course		3 course		4 course		
									1 sem	2 sem	3 sem	4 sem	5 sem	6 sem	7 sem	8 sem	
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)																	
M-1. Module of language training																	
LNG108	Foreign language		GED, RC	5	150	0/0/45	105	E	5								
LNG104	Kazakh (russian) language		GED, RC	5	150	0/0/45	105	E	5								
LNG108	Foreign language		GED, RC	5	150	0/0/45	105	E		5							
LNG104	Kazakh (russian) language		GED, RC	5	150	0/0/45	105	E		5							
M-2. Module of physical training																	
KFK101	Physical culture I		GED, RC	2	60	0/0/30	30	E	2								
KFK102	Physical culture II		GED, RC	2	60	0/0/30	30	E		2							
KFK103	Physical culture III		GED, RC	2	60	0/0/30	30	E			2						
KFK104	Physical culture IV		GED, RC	2	60	0/0/30	30	E				2					
M-3. Module of information technology																	
CSE677	Information and communication technology		GED, RC	5	150	30/15/0	105	E			5						
M-4. Module of socio-cultural development																	
HUM137	History of Kazakhstan		GED, RC	5	150	15/0/30	105	GE		5							
HUM120	Module of socio-political knowledge (sociology, political science)		GED, RC	3	90	15/0/15	60	E			3						
HUM134	Module of socio-political knowledge (cultural studies, psychology)		GED, RC	5	150	30/0/15	105	E			5						
HUM132	Philosophy		GED, RC	5	150	15/0/30	105	E				5					
M-5. Module of anti-corruption culture, ecology and life safety base																	
CHE656	Ecology and life safety	1	GED, CCH	5	150	30/0/15	105	E				5					
HUM136	Fundamentals of anti-corruption culture and law	1	GED, CCH	5	150	30/0/15	105	E				5					
MNG564	Basics of Financial Literacy	1	GED, CCH	5	150	30/0/15	105	E				5					
PET519	Fundamentals of scientific research methods	1	GED, CCH	5	150	30/0/15	105	E				5					
MNG489	Fundamentals of economics and entrepreneurship	1	GED, CCH	5	150	30/0/15	105	E				5					
CYCLE OF BASIC DISCIPLINES (BD)																	
M-6. Module of physical and mathematical training																	
MAT101	Mathematics I		BD, UC	5	150	15/0/30	105	E	5								
PHY468	Physics		BD, UC	5	150	15/15/15	105	E	5								

CHE495	Chemistry		BD, UC	5	150	15/30/0	105	E		5							
M-7. Module of basic training																	
GEN429	Engineering and computer graphics		BD, UC	5	150	15/0/30	105	E	5								
MAP570	Topographical graphics		BD, UC	3	90	0/0/30	60	E	3								
MAP536	Geodesy		BD, UC	6	180	30/0/30	120	E		6							
AAP418	Geodesy practical training		BD, CCH	2				R		2							
MAP474	Cartography		BD, UC	5	150	15/0/30	105	E			5						
MAP481	Geodetic instruments		BD, UC	5	150	15/0/30	105	E			5						
MAP565	Theoretical foundations of land management and cadastre		BD, UC	5	150	15/0/30	105	E				5					
ELC693	Fundamentals of electronics and electrical engineering		BD, UC	4	120	15/15/15	75	E				4					
MAP496	Pedology		BD, UC	5	150	15/0/30	105	E					5				
MAP490	Land Management control		BD, UC	5	150	15/0/30	105	E					5				
MAP114	Geoinformatics		BD, UC	5	150	15/0/30	105	E					5				CSE174
MAP442	Geodetic work in land management	1	BD, CCH	5	150	15/0/30	105	E					5				
MAP183	Engineering development of the territory	1	BD, CCH	5	150	15/0/30	105	E					5				
CHE950	ESG principles in inclusive culture	1	BD, CCH	5	150	30/0/15	105	E					5				
MAP477	Digital mapping		BD, UC	5	150	15/0/30	105	E						5			
MAP589	Land management and planning of settlements		BD, UC	6	180	30/0/30	120	E						6			
MAP188	Land reclamation	1	BD, CCH	5	150	15/0/30	105	E						5			
GIG136	Water resources management	1	BD, CCH	5	150	15/0/30	105	E						5			
MAP402	Remediation and protection of lands from erosion	2	BD, CCH	5	150	15/0/30	105	E						5			
MAP450	Soil assessment	2	BD, CCH	5	150	15/0/30	105	E						5			
MAP576	Monitoring of land	3	BD, CCH	5	150	15/0/30	105	E						5			
MAP470	Management of land surveying and cadastral works	3	BD, CCH	5	150	15/0/30	105	E						5			
MAP561	Land law	1	BD, CCH	5	150	30/0/15	105	E							5		
MNG562	Legal regulation of intellectual property	1	BD, CCH	5	150	30/0/15	105	E							5		
MAP584	Spatial planning, forecast of land resources	2	BD, CCH	5	150	15/0/30	105	E							5		
MNG563	Fundamentals of sustainable development and ESG projects in Kazakhstan	2	BD, CCH	5	150	30/0/15	105	E							5		
MAP580	Web-GIS basics	3	BD, CCH	5	150	15/0/30	105	E							5		
MAP466	Web-cartography	3	BD, CCH	5	150	15/0/30	105	E							5		
MAP181	Landscape Design	1	BD, CCH	5	150	30/0/15	105	E								5	
MAP180	Landscape science	1	BD, CCH	5	150	15/0/30	105	E								5	
CYCLE OF PROFILE DISCIPLINES (PD)																	
M-8. Module of professional activity																	
MAP476	Basics of the cadastre		PD, UC	5	150	15/0/30	105	E			5						
MAP155	Photogrammetry		PD, UC	5	150	15/0/30	105	E				5					MAP112
AAP109	Industrial internship I		PD, UC	4				R				4					
MAP420	Land Use Planning		PD, UC	5	150	15/0/30	105	E					5				
MAP455	State registration and accounting of lands		PD, UC	5	150	15/0/30	105	E					5				
AAP163	Industrial internship II		PD, UC	4				R						4			
MAP569	Organization and planning of land cadastre works		PD, UC	5	150	15/0/30	105	E							5		
MAP458	Automated technologies of cadastral work		PD, UC	5	150	15/0/30	105	E							5		MAP112
MAP564	Cadastral zoning, valuation and taxation of land		PD, UC	5	150	15/0/30	105	E							5		
MAP541	Remote sensing of the earth		PD, UC	6	180	30/0/30	120	E								6	
MAP587	Urban planning and planning of land cadastral works		PD, UC	6	180	30/0/30	120	E								6	
MAP588	Urban infrastructure design		PD, UC	5	150	15/0/30	105	E								5	
M-9. Module of final attestation																	

ECA103	Final examination		FA	8												8	
Additional type of training (ATT)																	
AAP500	Military training																
Total based on UNIVERSITY:									30	30	30	30	30	30	30	30	
									60		**60**		**60**		**60**		

Number of credits for the entire period of study

Cycle code	Cycles of disciplines	Credits			
		Required component (RC)	University component (UC)	Component of choice (CCH)	Total
GED	Cycle of general education disciplines	51	0	5	56
BD	Cycle of basic disciplines	0	74	42	116
PD	Cycle of profile disciplines	0	60	0	60
Total for theoretical training:		**51**	**134**	**47**	**232**
FA	Final attestation				8
TOTAL:					**240**

Decision of the Educational and Methodological Council of KazNRTU named after K.Satpayev. Minutes № 3 dated 20.12.2024

Decision of the Academic Council of the Institute. Minutes № 4 dated 12.12.2024

Signed:

Governing Board member - Vice-Rector for Academic Affairs — Uskenbayeva R. K.

Approved:

Vice Provost on academic development — Kalpeyeva Z. B.

Head of Department - Department of Educational Program Management and Academic-Methodological Work — Zhumagaliyeva A. S.

Director - Mining and Metallurgical Institute named after O.A. Baikonurov — Ryshkov K. .

Department Chair - Surveying and geodesy — Meirambek G. .

Representative of the Academic Committee from Employers ____Acknowledged____ — Mukhametov Y.