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

EDUCATIONAL PROGRAM
6B07316 - «Cadastre and geospatial planning»

Code and classification of the field of education: **6B07 «Engineering, manufacturing and construction industries»**
The code and classification of training areas: **6B073 «Architecture and construction»**
Group of educational programs: **B075 «Cadastre and land management»**
NRK Level: 6
ORC Level: 6
Duration of study: 4 years
Volume of credits: 240

Almaty 2025

Educational program 6B07316 – «Cadastre and geospatial planning» was approved at a meeting of the Academic Council of KazNRTU named after K.I.Satbayev.
Protocol №6 of 31.03.2025
Considered and recommended for approval at a meeting of the Educational and Methodological Council of KazNRTU named after K.I.Satbayev.
Protocol №2 of 12.03.2025

Educational program 6B07316 – «Cadastre and geospatial planning» developed by the academic committee in the direction of «Architecture and Civil engineering»

Full name	Academic degree/ academic title	Position	Place of work	Signature
Academic staff:				
Meirambek G.	Candidate of Technical Sciences.	Head of the Department	Kazakh National Research Technical University named after K.I.Satpayev	
Zhakypbek Y.	PhD	Professor	Kazakh National Research Technical University named after K.I.Satpayev	
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Student:				
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List of abbreviations and designations

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 Cadastre and Geospatial Planning educational program contributes to the achievement of the priority Sustainable Development Goals approved by the United Nations through the training of specialists with knowledge and skills in the field of rational land use, spatial analysis and sustainable spatial planning. The EP contributes to the achievement of the following SDGs:

SDG 4. Quality education - 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 Cadaster and Geospatial Planning educational program is a first–level qualification for three levels of the higher education system. Due to the qualification module and the final qualification work of the bachelors of the educational program.

2. The purpose and objectives of the educational program

The purpose of the educational program: "Cadastre and Geospatial planning" — to train specialists with in-depth knowledge and practical skills in the field of cadastral registration, land management, geodesy, territorial planning, as well as using modern

geoinformation technologies for effective management of land resources and the development of territorial plans. Graduates of the program should be able to solve the problems of spatial planning, ensuring sustainable land use, creating and managing cadastral data, as well as monitoring changes in land management and ecology of territories.

Objectives of the educational program:

1) Provide students with fundamental knowledge in the field of cadastre, including the principles of maintaining the land cadastre, registration of land rights, methods and technologies of cadastral measurements and assessment of the state of land resources.

2) Students should learn how to use GIS for spatial data analysis, creation of maps and modeling of territorial plans, which will make it possible to effectively manage land resources, monitor changes in land use and optimize urban planning processes.

3) The program provides training in spatial planning methods, including the development of master plans, zoning of territories, the creation of strategies for sustainable land use, and solving problems related to the design and development of urban and rural infrastructure.

4) Students will learn how to use modern technologies to monitor land resources, including satellite imagery, aerial photography, and other methods to assess land conditions, identify changes, and develop recommendations for nature conservation and land quality improvement.

5) The program includes training in the basics of land legislation, international standards and regulations governing cadastral registration and territorial planning, as well as training specialists who are able to work in accordance with legal norms and environmental standards.

6) Students will learn how to integrate various scientific disciplines — geodesy, ecology, law, economics and engineering — for an integrated approach to solving problems of land management, urban planning and sustainable development of territories.

7) As part of the program, students will become familiar with modern technologies in the field of cadastral data, GIS and digitalization of land relations, which allows graduates to work with up-to-date digital tools to improve the accuracy and efficiency of cadastral accounting and planning processes.

8) The educational program is aimed at developing skills in interdisciplinary teams, where specialists from various fields (engineers, environmentalists, lawyers, economists) jointly solve problems related to spatial planning, land management and sustainable development of territories.

3. Requirements for the assessment of learning outcomes of an 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 assignments.

Understand and explain the key concepts of cadastre, land management and

spatial planning.

Apply the legal and regulatory framework for land management in territorial planning.

Develop and argue solutions based on theoretical knowledge in the field of GIS, geodesy and monitoring.

Possess skills in working with GIS, geodetic instruments, cadastral data, as well as modeling territorial plans.

Possess the skills of conducting field surveys and geodetic measurements, as well as data processing in the framework of cadastral and planning projects.

Students can work in teams, developing projects to integrate cadastre and spatial planning, which will allow them to assess their ability to work in a team, as well as coordinate various aspects of projects (for example, ecology, economics, infrastructure).

The ability to clearly and convincingly present design decisions, justify the decisions made in the field of cadastre and planning.

Skills of working with GIS, geodetic instruments, cadastral data.

The ability to analyze and interpret land data and propose solutions to improve land use.

Knowledge and application of land legislation, standards and norms in the field of cadastre and planning.

The ability to work effectively in interdisciplinary teams, defend and present their ideas.

Graduates can work in public and private bodies dealing with cadastral registration and registration of land plots. Their responsibilities will include maintaining cadastral records, filing land documents, verifying ownership rights, and other cadastral procedures.

Among the possible positions:

Specialist in Territorial Planning and Management

Graduates can develop and implement spatial development strategies, including the planning of new areas, agricultural lands, industrial zones, transport infrastructure, etc.

GIS (Geoinformation Systems) Specialist

Graduates with knowledge in the field of GIS will be able to work with spatial data, develop cartographic materials and models to support decision-making in the field of territorial planning, land management and cadastre.

Consultant in the field of land relations

Graduates can work as consultants, helping private and public organizations solve issues related to land use, cadastre, optimization of land use and geospatial development.

Territory Monitoring Specialist

In this role, graduates will be involved in monitoring land changes, including the use of satellite data, aerial photography, and other technologies to analyze and account for land resources.

Project Manager in the field of urban planning and land management

Specialists with knowledge in the field of spatial planning can work as project managers for the development and implementation of urban planning and land projects, including the construction of residential and commercial facilities.

Analyst on the use of land resources

These specialists will analyze the current use of land, study the effectiveness of the use of natural resources, and develop recommendations for improving land legislation and resource management.

These professions are in demand in Kazakhstan and meet modern labor market requirements.

4. Passport of the educational program

4.1 General information

№	Field name	Note
1	Code and classification of the field of education	B074 «Urban planning, construction works and civil engineering»
2	Code and classification of training areas	6B073 «Architecture and Construction»
3	Group of educational programs	B075 «Cadastre and land management»
4	Name of the educational program	6B07316 «Cadastre and geospatial planning»
5	Brief description of the educational program	«Cadastre and Geospatial Planning» covers areas of knowledge and practice related to land management, cadastral accounting, spatial planning and the use of geoinformation technologies. Graduates of this specialty are trained in methods of assessment, registration and monitoring of land plots, development and implementation of territorial plans, as well as the use of geodetic and GIS technologies for the creation and analysis of spatial data.
6	The purpose of the educational program	The purpose of the educational program «Cadastre and Geospatial Planning» is to train specialists with in—depth knowledge and practical skills in the field of cadastral registration, land management, geodesy, territorial planning, as well as using modern geoinformation technologies for effective management of land resources and the development of territorial plans. Graduates of the program should be able to solve the problems of spatial planning, ensuring sustainable land use, creating and managing cadastral data, as well as monitoring changes in land management and ecology of territories.
7	Type of educational program	New educational program
8	The NRK level	6
9	ORC Level	6
10	Distinctive features of the educational program	No

11	List of educational program competencies:	**General cultural competencies (GCC)** GCC-1. He is able to carry out written and oral communication in Russian and a foreign language to solve the tasks of professional activity. GCC -2. He is able to work in a team, effectively interact with colleagues, partners and clients. GCC -3. He is able to critically assess events and make decisions in non-standard situations. GCC -4. He is able to independently organize activities, set goals, plan and manage time. **General Professional Competencies (GPC)** GPC -1. Able to use the regulatory framework in the field of cadastre, land use and urban planning. GPC -2. Knowledge of basic methods of geodetic, cartographic and cadastral measurements. GPC -3. It is able to work with geodata, analyze and visualize them using modern GIS tools. GPC -4. Knowledge of methods and technologies for obtaining, processing and interpreting spatial information, including remote sensing methods. GPC -5. He is able to take into account socio-economic, legal and environmental aspects in his professional activities. **Professional Competencies (PC)** PC-1. It is capable of carrying out cadastral and land management works using modern technologies and equipment. PC-2. It is capable of performing topographic, geodetic and cartographic work within the framework of cadastral and urban planning activities. PC-3. He is able to develop projects for the planning of territories, including zoning and land use assessment. PC-4. Knowledge of technologies for collecting, systematizing and analyzing spatial data for the purposes of state and municipal management. PC-5. He is able to participate in the state cadastral assessment and preparation of documents for the registration of real estate. PC-6. He is able to use digital technologies and software tools to solve applied problems of cadastre and spatial planning. **Digital Competencies (DC)** DC-1. Skills of working with software products for spatial analysis (QGIS, ArcGIS, AutoCAD, MapInfo, etc.). DC-2. The ability to work with digital maps, satellite images, 3D models, remote sensing data. DC-3. Knowledge of the basics of databases and spatial information storage systems. DC-4. The use of digital tools in cadastral, land management and project documentation.

12	Learning outcomes of the educational program:	1.Develop basic theoretical approaches and key concepts in the field of geodesy, cadastre, land management and spatial regulation, and explain their meaning in a professional context. 2.Apply current legal norms and regulatory and methodological documents in land management, spatial design and cadastral activities. 3.Formulate design solutions using geoinformation and automated technologies, geodesy methods and instrumental approaches of spatial analysis, with justification of their practical applicability. 4.Confidently use geodetic and cadastral equipment, as well as digital and GIS platforms to analyze and model territorial objects and processes. 5.Conduct field, desk and remote measurements, process spatial data and use them for cadastre, land management and urban planning needs. 6.Participate in teamwork to develop integrated territorial projects, taking into account environmental, social and economic aspects of sustainable development. 7.Present professional solutions in visual and textual form, argue and defend proposed approaches using digital technologies and graphic tools. 8.Analyze cadastral, environmental and territorial information, interpret data and propose ways of its optimal use. 9.Apply mathematical and natural science methods in solving professional problems and conducting applied research related to planning and cadastre. 10.Evaluate and apply the basics of economic theory, management and entrepreneurship for effective project management in spatial planning and land management.
13	The form of education	Daytime
14	Duration of training	4 years
15	Volume of loans	240
16	Languages of instruction	russian, kazakh, english
17	Academic degree awarded	Bachelor of engineering and technology
18	Developers and authors:	Department of Surveying and geodesy

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)														
				LR 1	LR 2	LR3	LR 4	LR 5	LR 6	LR 7	LR 8	LR9	LR10	LR11	LR 12	LR13	LR14	LR 15
The cycle of general education subjects Required component																		
1	Foreign language	English is a discipline of the general education cycle. After determining the level (according to the results of diagnostic testing or IELTS results), students are divided into groups and disciplines. The name of the discipline corresponds to the level of English language proficiency. When moving from level to level, the prerequisites and post-requirements of discipline are observed.	5	v														
2	Kazakh (Russian) language	Kazakh (Russian) language The socio-political, socio-cultural spheres of communication and functional styles of the modern Kazakh (Russian) language are considered. Course 8 highlights the specifics of the scientific style in order to develop and activate students' professional and communication skills. The course allows students to practically master the basics of scientific style and develops the ability to perform structural and semantic text analysis.	5	v														
3	Physical Culture	During the course, the student will	8	v														

		master the practical use of skills in performing the basic elements of athletics techniques, sports games, gymnastics and a set of standards for general physical training, including professionally applied physical training or one of the sports, methods of conducting independent physical exercises.																	
4	The 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; to acquaint students with the problems of the formation and development of statehood and historical and cultural processes; to promote the formation of humanistic values and patriotic feelings among students; to teach students to use the acquired historical knowledge in educational, professional and daily life; to assess the role of Kazakhstan in world history.	5		**v**														
5	Philosophy	The purpose of the discipline is to teach students the theoretical foundations of philosophy as a way of cognition and spiritual exploration of the world; to develop their interest in fundamental knowledge, stimulate the need for philosophical assessments of historical events and facts of reality, assimilate the idea of	5				**v**												

		the unity of the world historical and cultural process while recognizing the diversity of his skills in applying philosophical and general scientific methods in professional activities.																
6	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, on social communities and personalities, 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 socio-political processes, for the formation of political culture, the development of personal position and a clearer understanding of the measure of their responsibility; to help master the political, legal, moral, ethical, and socio-cultural norms necessary for acting in the interests of society, forming personal responsibility, and achieving personal success.	3				v											
7	Module of socio-political knowledge (cultural studies, psychology)	The purpose of the disciplines is to study the real processes of cultural activity of people who create material and spiritual values.,	5				v											
8	Information and communication technologies	to identify the main trends and patterns of cultural development, the change of cultural epochs, methods	5				v											

		and styles, their role in the formation of a person and the development of society, as well as to master psychological knowledge for the effective organization of interpersonal interaction, social adaptation in the field of their professional activities.																
The cycle of general education subjects Component of choice																		
1	Fundamentals of anti-corruption culture and law	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. Improving the anti-corruption culture; actions in situations of conflict of interests.	5		v		v											
2	Fundamentals of Economics and Entrepreneurship	The discipline is studied in order to develop skills in analyzing economic concepts such as supply and demand, and market equilibrium. The basics of business creation and management, development of business plans, risk assessment and strategic decision-making are included.	5	v	v	v												
3	Ecology and life safety	The study of the problems 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	5	v	v	v												

		field of its safety, ways to solve environmental problems; safety of life in the technosphere, natural and man-made emergencies.																
4	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															
5	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.	5	**v**	**v**	**v**												
The cycle of basic disciplines The university component																		
1	Mathematics	The purpose of mastering the discipline is to form the theoretical and practical foundations of mathematics and its applications. Based on the study of the mathematics section, students should be given 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 to the	5						**v**									

		extent that it allows you to explore 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, derivatives and differentials, the study of the behavior of functions, complex numbers, and polynomials. Indefinite integrals, their properties and methods of calculation. Definite integrals and their applications. Improper integrals.																
2	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.																
3	General chemistry	Laws, theoretical provisions and conclusions that underlie chemical disciplines; properties and relationships of chemical elements based on the periodic law of D.I. Mendeleev and on modern concepts of the structure of matter;	5											**v**	**v**			**v**

		fundamentals of chemical thermodynamics and kinetics; processes in solutions; the structure of complex compounds.																
4	Engineering and computer graphics	Students will study ESCD standards, graphical primitives, geometric constructions, methods and properties of orthogonal projection, Monge plots, axonometric projections, metric problems, types and features of connections, sketching of parts and assembly drawings, detailing, as well as the creation of 3D complex solid objects in AutoCAD.	5						v						v			v
5	Computer technologies in planning	Theoretical knowledge and practical skills in using modern computer technologies for effective planning, analysis and implementation of projects. Content: Fundamentals of digital modeling, application of GIS and CAD in planning, methods of analyzing spatial and tabular data, visualization of results, project management using specialized software (AutoCAD, ArcGIS, etc.), as well as integration of various software platforms in planning.	3						v									v
6	Geodesy	He will master the basic concepts of the Shape and size of the Earth, the coordinate systems used in geodesy, the orientation of lines on the ground, plans, maps, profiles, scale, terrain,	6								v	v	v					

		angular and linear measurements, altitude measurements, methods and measurements of topographic surveys, the accuracy of geodetic measurements, the use of geodetic instruments, as well as in-house processing of received geodetic measurements.																
7	Cartography	To study the mathematical basis of maps and types of cartographic projections. Be able to choose and justify the scale, recognize the cartographic projection. To study distortions on maps, methods for determining distortions of angles, shapes, and areas. To master cartographic methods of terrain representation. To study the main sources for the compilation of thematic and geographical maps. Master the basic methods of map research. Learn how to create a map layout. To master the basic methods of creating maps in the ArcGIS program.	5												v		v	
8	Geodetic instruments	Purpose: 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. Contents: The study of the full cycle (podgotovka, working and receiving	5								v	v	v					

		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.																
9	Fundamentals of urban planning	Purpose: formation of students' theoretical and practical knowledge necessary for the development and implementation of urban planning projects, as well as in the training of methods of design and organization of effective use of urban territory taking into account socio-economic, environmental and cultural factors. The discipline is aimed at training specialists capable of solving the problems of rational and sustainable urban development, creating a comfortable, functional and safe urban environment for the life and work of the population.	5				**v**						**v**					
10	Foreign land cadastre systems	Objective: To develop knowledge and skills in the field of strategic planning for territorial development. Mastering methods of analysis, forecasting, and development of sustainable development strategies for territories.	5								**v**	**v**	**v**					

		Content: Fundamentals of strategic planning. Methods for analyzing territorial resources. Risk forecasting and assessment. Strategy development for sustainable development. Infrastructure and economic planning. Social and environmental aspects																
11	Pedology	Objective: 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, evaluation of the main types of soils according to their agrotechnical characteristics, taking into account the peculiarities of their use and factors contributing to soil salinization.	5									v				v		
12	Land Management control	Master knowledge about land resources to organize the rational use of land and determine measures to reduce the anthropogenic impact on the territory. Learn to apply knowledge of the laws of the country for the legal regulation of land and property relations and control over the use of land and real estate. Use knowledge to manage land resources and real estate, as well as in the organization and conduct of cadastral and land management works.	5								v	v	v					

13	GIS technologies in urban planning	Objective: To develop students' theoretical knowledge and practical skills in using GIS technologies for analysis, planning and management of urban areas. Content: Study of the basics of GIS, spatial modeling, infrastructure analysis, zoning, visualization of urban development data, map development, use of GIS for sustainable development, design and monitoring of the urban environment using modern software solutions (ArcGIS, QGIS, etc.).	5																
14	Land management and planning of settlements	Master theoretical knowledge and practical skills in the field of drawing up projects and plans for land management and planning of settlements and master the methodology for their development. To study the basic provisions of territorial planning and to master the architectural, planning and spatial organization of populated areas. Analyze the problem of rational use of land and the establishment of boundaries of rural settlements.	6																
15	Digital mapping	to study the methods of creating digital and electronic maps, as well as the automation of cartographic support of land management works. To master the technology of creating digital topographic maps containing logical and mathematical	5						**v**					**v**	**v**				

		descriptions of mapped objects and the relationships of terrain objects in the form of their combinations, intersections and neighborhood.																
The cycle of basic disciplines Component of choice																		
1	Digital Platforms for Urban Planning and Cadastre.	Goal: To equip students with theoretical and practical skills in utilizing digital platforms for effective urban planning and cadastre management. Description: This discipline explores modern digital tools and technologies (GIS, BIM, databases) applied for the collection, analysis, and visualization of spatial data, the development of urban planning documentation, and the management of land and property complexes.	5						v							v		v
2	Automated technologies in urban planning and cadastre.	Objective: Students to master automated technologies to improve the efficiency of urban planning and cadastre management. Description: The discipline studies the use of GIS, BIM, CAD and databases for the collection, processing, analysis of spatial information, automation of the development of urban planning documentation and management of the land and property complex.	5											v	v			
3	Water resources management	The purpose of teaching the discipline is to train specialists in the field of environmental management	5								v	v	v					

		and water use with in-depth knowledge of the basics of water resources management. The main objectives of studying the discipline are: - a deep understanding of the specifics 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 the departments involved in solving the problems of water bodies, regulating issues of their optimization and restoration, controlling water quality; - acquire skills in assessing water management activities in the territory.																
4	Land reclamation	Master theoretical knowledge in the field of regulation of water and associated air, food, thermal and salt regimes of soils in combination with appropriate agricultural technology and landscape features. To study methods for creating and maintaining optimal conditions in the "soil-plant" system to increase the stability of agricultural production and the environmental sustainability of agro-reclamation landscapes, as well as to prevent water and wind erosion of soils and to reclaim technogenic landscapes.	5												v		v	

5	District layout	Objective: To build skills in regional planning with a focus on functional zoning, spatial organization, and sustainable development. Emphasis on natural, socio-economic, and infrastructural factors in planning processes. Content: Fundamentals of regional planning. Zoning. Resource assessment. Spatial design. Socio-economic analysis. Infrastructure planning. Environmental considerations.	5						v										
6	Territorial planning and forecasting	Target: Get an idea about territorial planning and forecasting on the use of land resources and on ensuring the use of land in areas that are environmentally unfavorable. Master the methods of development and adoption of management decisions in land management and cadastre. Own the methodology for developing projects for the use of land resources, land management schemes and other design and forecast materials. Be able to take into account the target setting for the development of a market mechanism for land use.	5																
7	UAVs in Urban Planning	Objective: Formation of knowledge and skills in using UAVs (Unmanned Aerial Vehicles) in urban planning. Mastery of methods for data collection, processing, and analysis	5											v			v		

		to optimize the design and development of urban infrastructure. Content: Basics of working with UAVs, monitoring and mapping urban areas, photogrammetry and laser scanning for creating 3D models, software for data processing, the use of UAVs in transportation network planning and urban infrastructure assessment.																	
8	UAVs in the Development of Urban Infrastructure	Objective: Acquiring skills in using UAVs for monitoring and optimizing infrastructure processes in settlements, improving planning and development of infrastructure. Content: Introduction to UAVs, photogrammetry and laser scanning, data processing methods for infrastructure analysis, creation of digital terrain models, monitoring of public services, solutions for infrastructure resilience and safety, traffic flow management.	5						**v**										
9	Urban planning legislation and regulations	Objective: To provide students with knowledge of urban planning legislation and regulations governing territorial development and construction. To master the principles of applying legal norms in design and construction activities. Content: Fundamentals of urban planning legislation. Regulatory documents in design. Rights and responsibilities of urban planning	5																

		participants. Land use regulations. Environmental and social requirements.																
10	Management in the field of territorial planning	Objective: To develop students' skills in territorial planning management, efficient use of land resources and improvement of the urban environment. Content: Management in territorial planning, organization of land management and cadastral works, management of urban areas, economics of land resources, analysis of the impact of management decisions on the development of the land market and the use of urban lands.																
11	Management in urban planning	Objective: To develop students' skills and knowledge for the effective management of urban development projects aimed at the sustainable development of urban areas. Contents: Management in construction, economics and management of land management, project management, investment and construction management, modern management technologies, application of information technology in construction, practical application of management in urban planning to solve real problems																

12	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.	3															v
13	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.	3														v		v
14	ESG principles in inclusive culture	Purpose of the course: It focuses on studying ESG (Environmental, Social, Governance) principles and their interaction with the creation of	5																

		an inclusive culture within an organization. Content: Students will gain knowledge on how implementing ESG principles contributes to corporate social responsibility, sustainable development, and equal opportunities for all employees, including those who may face various forms of discrimination. The course will help students understand the importance of an inclusive culture in achieving long-term business goals and ensuring sustainable organizational development.																
15	Legal regulation of intellectual property	The discipline covers the fundamentals of IP law, including copyright, patents, trademarks, and industrial designs. Students learn how to protect and manage intellectual property rights, as well as consider legal disputes and how to resolve them.	5						**v**					**v**				
16	Planning and forecasting of land use	Purpose: use of land resources, methods of planning and forecasting when using 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	5						**v**					**v**				

		land resources through spatial planning and forecasting, contributing to the sustainable development of territories, preventing land degradation and effective management of natural resources.																
17	Fundamentals of sustainable development and ESG projects in Kazakhstan	It introduces the principles of sustainable development and the implementation of ESG practices in Kazakhstan, includes the study of national and international standards, the analysis of successful ESG projects and strategies for their implementation in enterprises and organizations.	5						v					v				
The cycle of profile disciplines The university component																		
1	Basics of the cadastre	The purpose is to systematize and record information about real estate in a certain territory, create a single database about land plots and real estate objects, their owners, rights to them, as well as various restrictions and encumbrances associated with these objects.	5						v					v				
2	Infrastructure Planning of Territories	The goal of the discipline is to develop a comprehensive understanding among students of the principles, methods, and objectives of planning and developing infrastructure systems of various scales, from local settlements to large regions. The course examines	5													v	v	v

		the regulatory and legal frameworks, urban planning, and economic aspects of creating sustainable and efficient infrastructure that ensures comfortable living, economic activity, and environmental safety.																
3	Land Use Planning	Acquire theoretical knowledge and practical skills that allow you to master the methodology for performing land management design. To study the principles of land management, classification and content of land management projects. Know the assessment of the economic efficiency of design solutions, ways of organizing land use and land ownership, design features of land holdings for various purposes. To master the principles of land management design, taking into account the conditions of various territories.	5														v	v
4	Cadastral zoning, land valuation and taxation	To study the regulatory framework of cadastral valuation of lands, to get an idea of zoning and taxation of lands. To master the methods of zoning the territories of cities and rural settlements for the functional use of land.	6							v	v	v						
5	State registration and accounting of lands	To study the basics of registration of property rights to real estate and transactions with it, the patterns and prospects for the development of a unified accounting and registration	5							v	v	v						

		system of the Republic of Kazakhstan. Be able to analyze legal relations and regulations in the field of registration of rights and accounting for real estate, interpret and apply these acts; solve practical problems, applying regulatory legal acts in the field of accounting and registration actions. Possess skills in working with legal acts.																
6	Organization and planning of land cadastre works	To master the regulation of land relations and land use rights, the calculation of the volume of land management work and the preparation of a balance of personnel; structuring the system of land resources; creation of land management groups; wage fund; calculation of labor income. To study the management of land management and cadastral work, budgeting, costing and acceptance of work, as well as keeping records and monthly reporting on the amount of work performed.	5												v		v	
7	Remote sensing of the earth	Purpose: The purpose of the discipline is to master the methods of processing and analyzing satellite imagery data in solving cartographic, geodetic and environmental problems. Contents: Students will be able to understand the results of remote sensing of the Earth, use modern	6											v	v			v

		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.																	
8	Organization of territorial landscape and ecological sensing	Objective: To develop knowledge and practical skills in landscape-ecological surveying, including spatial analysis, monitoring, and assessment of environmental parameters using GIS and remote sensing technologies. Content: Basics of landscape ecology. Remote sensing methods. Land classification and mapping. Satellite data processing. Human impact analysis. Application of GIS tools.	5																
9	3D modeling in territory planning	Objective: study of methods for creating virtual or realistic three-dimensional models that allow the size, shape, appearance and other characteristics of a territory to be represented with maximum geometric accuracy. Content: development of skills in constructing three-dimensional models of terrain and objects for effective territorial planning, using Earth remote sensing	6																

		data and ground-based geodetic measurements, as well as modern software. Be able to create three-dimensional models of objects based on design documentation and models of territories based on remote sensing data, optimize the locations of designed objects taking into account the environment and infrastructure.																
The cycle of profile disciplines Component of choice																		
1	Strategic development of the territory	Objective: To develop knowledge and skills in the field of strategic territorial development planning. Mastering methods for analyzing, forecasting, and developing strategies for sustainable territorial development. Content: Fundamentals of strategic planning. Territorial resource analysis methods. Forecasting and risk assessment. Development of sustainable development strategies. Infrastructure and economic planning. Social and environmental aspects.	5															**v**
2	Regional development planning	Objective: To develop students' knowledge and skills in the field of regional socio-economic and territorial development planning. Study of methods for assessing the	5												**v**			**v**

		potential and sustainable development of regions. Content: Fundamentals of regional planning. Socio-economic development. Regional potential assessment methods. Strategic planning. Infrastructure development. Environmental and demographic aspects.																

5. The curriculum of the educational program

SATBAYEV UNIVERSITY

«APPROVED»
Decision of the Academic Council
NP JSC «KazNRTU
named after K.Satbayev»
dated 31.03.2025 Minutes № 12

WORKING CURRICULUM

Academic year: 2025-2026 (Autumn, Spring)
Group of educational programs: B075 - "Inventory and land management"
Educational program: 6B07316 - "Cadastre and geospatial planning"
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					
MNG489	Fundamentals of economics and entrepreneurship	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					
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																	
MAP603	Computer technologies in planning		BD, UC	3	90	0.0/30	60	C	3								
GEN429	Engineering and computer graphics		BD, UC	5	150	15/0/30	105	E	5								
MAP536	Geodesy		BD, UC	6	180	30/0/30	120	E		6							
AAP418	Geodesy practical training		BD, UC	2				R		2							
MAP481	Geodetic instruments		BD, UC	5	150	15/0/30	105	E			5						
MAP474	Cartography		BD, UC	5	150	15/0/30	105	E			5						
MAP608	Fundamentals of urban planning		BD, UC	5	150	15/0/30	105	E				5					
MAP624	Foreign land cadastre systems		BD, UC	4	120	15/0/30	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				
MAP604	GIS technologies in urban planning		BD, UC	5	150	15/0/30	105	E					5				
MAP610	Digital Platforms for Urban Planning and Cadastre.	1	BD, CCH	5	150	15/0/30	105	E					5				
MAP611	Automated technologies in cadastre and urban planning.	1	BD, CCH	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			
MAP477	Digital mapping		BD, UC	5	150	15/0/30	105	E						5			
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			
MAP612	District layout	2	BD, CCH	5	150	15/0/30	105	E						5			
MAP621	Territorial planning and forecasting	2	BD, CCH	5	150	15/0/30	105	E						5			
MAP605	UAVs in Urban Planning	3	BD, CCH	5	150	15/0/30	105	E						5			
MAP606	UAVs in the Development of Urban Infrastructure	3	BD, CCH	5	150	15/0/30	105	E						5			
MAP616	Urban planning legislation and regulations	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		
MNG562	Legal regulation of intellectual property	1	BD, CCH	5	150	30/0/15	105	E							5		
MNG563	Fundamentals of sustainable development and ESG projects in Kazakhstan	2	BD, CCH	5	150	30/0/15	105	E							5		
MAP622	Planning and forecasting of land use	2	BD, CCH	5	150	15/0/30	105	E							5		
CIV256	Fundamentals of scientific research	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		
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						
MAP602	Infrastructure Planning of Territories		PD, UC	5	150	15/0/30	105	E				5					
AAP109	Industrial internship I		PD, UC	4				R				4					
MAP455	State registration and accounting of lands		PD, UC	5	150	15/0/30	105	E					5				
MAP420	Land Use Planning		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		
MAP609	Organization of territorial landscape-ecological surveying		PD, UC	5	150	15/0/30	105	E							5		
MAP623	Cadastral valuation, zoning and land taxation		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	
MAP607	3D modeling in territory planning		PD, UC	6	180	30/0/30	120	E								6	
MAP617	Regional development planning	1	PD, CCH	5	150	15/0/30	105	E								5	
MAP618	Strategic development of the territory	1	PD, CCH	5	150	15/0/30	105	E								5	
MAP619	Management in the field of territorial planning	2	PD, CCH	5	150	15/0/30	105	E								5	

MAP620	Management in urban planning	2	PD, CCH	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	76	35	111
PD	Cycle of profile disciplines	0	55	10	65
Total for theoretical training:		**51**	**131**	**50**	**232**
FA	Final attestation				8
TOTAL:					**240**

Decision of the Educational and Methodological Council of KazNRTU named after K.Satpayev. Minutes №5 dated 12.03.2025

Decision of the Academic Council of the Institute. Minutes №5 dated 23.01.2025

Signed:

Governing Board member - Vice-Rector for Academic Affairs	Uskenbayeva R. K.
Approved:	
Vice Provost on academic development	Kalpeyeva Z. S.
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.