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

EDUCATIONAL PROGRAM
7M07330 - «Land management»

Code and classification of the field of education: **7M07 Engineering, Manufacturing and Civil engineering**
Code and classification of training areas: **7M073 Architecture and Civil engineering**
Group of educational programs: **M128 Land Management**
Level based on NQF: 7
Level based on IQF: 7
Study period: 1,5 years
Amount of credits: 90

Almaty 2025

Educational program 7M07330 – «Land management» 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 7M07330 – «Land management» 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 Guldana	PhD in Technical Sciences, Associate Professor	Head of Department of Surveying and geodesy	NPJSC «K.I. Satbayev Kazakh National Research Technical University»	
Zhakypbek Yryszhan	PhD, Associate Professor	Professor	NPJSC «K.I. Satbayev Kazakh National Research Technical University»	
Aitkazinova Shynar Kasymkanovna	PhD	Associate Professor	NPJSC «K.I. Satbayev Kazakh National Research Technical University»	
Employer:				
Mukhametov Yesen Serikovich	-	Acting Director	Almaty Regional Branch of RSE «GOSGRADCADASTR»	
Student:				
Iskakov Bolatbek Meirambekuly	-	1st year Doctoral Student	NPJSC «K.I. Satbayev Kazakh National Research Technical University»	

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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 educational program "Land Management" contributes to the achievement of the priority Sustainable Development Goals approved by the United Nations through the training of highly qualified specialists with competencies in the field of land relations regulation, cadastral registration, rational use and protection of land. Graduates of the program play a key role in ensuring the sustainable development of territories, effective management of land resources and legal protection of land ownership. The educational program contributes to the achievement of the following Sustainable Development Goals (SDGs):

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

Land management is a system of measures to ensure compliance with the land legislation of the Republic of Kazakhstan aimed at regulating land relations, organizing the rational use and protection of land.

2. The purpose and objectives of the educational program

Goal EP: training of highly qualified scientific, technical and engineering

personnel, whose activities are aimed at solving complex problems in the field of land management, cadastre and land and property relations, capable of carrying out various design, production, technological, organizational and managerial activities at a high technical level in the public and private sector, in organizations of any form of ownership.

Tasks EP:

Task 1: The readiness of specialists for research and design work in the field of geodesy, cartography, geoinformatics, surveying and land management, including in related fields related to the selection of necessary research methods, modification of existing and development of new methods based on the objectives of a specific study.

Task 2: The readiness of specialists for production and technological activities that ensure the introduction of new digital developments at the local level.

Task 3: The readiness of specialists to search for and obtain new information necessary to solve professional tasks in the field of knowledge integration in relation to their field of activity, to actively participate in the activities of an enterprise or organization.

Task 4: The readiness of specialists for scientific, informational, ideological and problematic communications in the professional environment and in the audience of non-specialists with a clear and deep justification of their position, to engage in organizational, managerial and service activities, to be aware of the responsibility for making their professional decisions.

Task 5: The readiness of specialists for self-study and continuous professional development during the entire period of scientific or professional activity.

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 general education program and for its individual modules, disciplines or tasks.

The main task at this stage is to choose methods and means of evaluation for all types of control, with the help of which it is possible to effectively assess the achievement of the planned learning outcomes at the subject level.

4. Passport of the educational program

4.1. General information

№	Field name	Note
1	Code and classification of the field of education	7M07 Engineering, Manufacturing and Civil engineering
2	Code and classification of training directions	7M073 Architecture and Civil engineering
3	Educational program group	M128 Land management

4	Educational program name	7M07330 Land management
5	Short description of educational program	Land management is a system of measures to ensure compliance with the land legislation of the Republic of Kazakhstan aimed at regulating land relations, organizing the rational use and protection of land.
6	Purpose of EP	Training of highly qualified scientific, technical and engineering personnel, whose activities are aimed at solving complex problems in the field of land management, cadastre and land and property relations, capable of carrying out various design, production, technological, organizational and managerial activities at a high technical level in the public and private sector, in organizations of any form of ownership.
7	Type of EP	New EP
8	The level based on NQF	7
9	The level based on IQF	7
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, including in the field of land and property relations. **GCC-2.** Teamwork skills and interaction with colleagues, government officials, citizens and customers in solving land management and cadastral tasks. **GCC-3.** The ability to make informed decisions in non-standard situations, critically evaluate information and propose sustainable solutions in the field of land use. **GCC-4.** Skills of self-organization, setting professional goals, time planning, and improving personal effectiveness. **General Professional Competencies (GPC):** **GPC-1.** Knowledge of the regulatory framework in the field of land management, cadastre, land monitoring and urban planning regulation. **GPC-2.** Knowledge of methods of cadastral, geodetic, cartographic and land management measurements. **GPC-3.** Skills in collecting, analyzing, and maintaining spatial data for the development of spatial planning schemes and land management projects. **GPC-4.** The use of remote sensing methods for monitoring land use and land conditions. **GPC-5.** Understanding the environmental, legal and engineering aspects of rational land use and protection of land resources. **Professional Competencies (PC):** **PC-1**. Development of land management and cadastral works projects, carrying out land assessment procedures and zoning of territories. **PC-2.** Organization and execution of cadastral surveys, land surveying and preparation of land management documentation.

		PC-3. Carrying out cadastral land assessment, forming cadastral maps and maintaining the relevance of cadastral data. **PC-4**. Analysis and interpretation of spatial information using geographic information systems (GIS). **PC-5.** Participation in the design, coordination and implementation of rational land use schemes at the state and local levels. **PC-6.** Preparation of reports, analytical reports and proposals for public authorities and private clients. **Digital Competencies (DC):** **DC-1.** Possession of specialized software for cadastre and land management: ArcGIS, QGIS, AutoCAD, MapInfo, Agisoft, ENVI, etc. **DC-2.** Ability to work with digital maps, aerial photographs, satellite images, 3D models and GNSS data. **DC-3.** Knowledge of cadastral and spatial information databases, their administration and integration skills. **DC-4.** The use of Web cartography, Web-GIS and cloud platforms in land management, cadastral and monitoring activities.
12	Learning outcomes of educational program	1.Develop land management projects and schemes, territorial planning schemes, measures to study the state and protection of land, conduct land monitoring. Make optimal management decisions. 2.Apply modern computer technologies for automated design of production processes in the land cadastral industry. 3.Apply skills of familiarization with legal and regulatory acts regulating land relations, development of technical documentation on land management and territorial planning. 4.Be able to use modern computer technologies, including web-based GIS systems to develop database management systems, analyze mathematical processing methods, support creative initiatives, and prepare applications for inventions and industrial designs. Also, be able to effectively analyze remote sensing data when monitoring changes in the natural environment and anthropogenic objects to ensure the safety of the population and maintain sustainable economic development of the country. 5.To use the skills of performing professional tasks in the field of land cadastre, as well as the ability to manage and develop land management projects. 6.Conduct research and pedagogical work, improve the intellectual and general cultural level, improve the moral and physical development of one's personality in the competence of professional activity. 7.Apply the skills to express your thoughts fluently and clearly in English and use them as a means of business communication at a professional level.

13	Education form	Full-time
14	Period of training	1,5 years
15	Amount of credits	90
16	Languages of instruction	Russian, Kazakh
17	Academic degree awarded	Master of engineering and technology
18	Developer and authors	Department «Mine Surveying and Geodesy»

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

№	Name of the discipline	Brief description of the discipline	Number of credits	Generated learning outcomes (codes)						
				LR1	LR2	LR3	LR4	LR5	LR6	LR7
Cycle of basic disciplines University component										
1.	Foreign language (professional)	The purpose of the discipline is to acquire and improve competencies in accordance with trade standards of foreign education, capable of competing in the labor market, because through a foreign language, the future master gains access to academic knowledge, new technologies and modern information, allowing the use of a foreign language as a means of communication in the intercultural, professional and scientific activities of the future master.	2						v	
2.	Management	To form a scientific understanding of management as a type of professional activity. Contents: Mastering the general theoretical principles of managing socio-economic systems; acquiring skills and abilities in practical problem-solving of managerial issues; studying global management practices and the specificities of Kazakhstani management; training in solving practical issues related to managing various aspects of organizational activities.	2							v
3.	Psychology of management	To acquire skills in making strategic and managerial decisions, taking into account the psychological characteristics of the	2							v

		individual and the team. Content: the modern role and content of psychological aspects in management activities, methods for improving psychological literacy, the composition and structure of management activities, both at the local and foreign levels, the psychological feature of modern managers.								
Cycle of basic disciplines Elective component										
4.	Automated methods of land research	This discipline includes theoretical and practical aspects of automated methods of Earth exploration using aerospace sensing, geoinformation modeling, integration of various methods for use in systematic geographical exploration of the earth and includes the following sections: methods and means of automated Earth exploration, direct, space, photomethods, combined methods and data processing	5							
5.	Modern Methods of Territorial Organization	Objective: To introduce students to modern methods and technologies of territorial organization aimed at efficient land use and sustainable development. Spatial planning. Zoning of territories. Infrastructure design. GIS and 3D modeling. Environmental and social aspects of planning. Principles of sustainability. Analysis of territorial conflicts and resolution strategies.	5							
6.	Sustainable Territorial Development	Goal: Mastering principles and methods of sustainable territorial development. Developing skills in integrated planning considering ecological, social, and	5							

		engineering factors. Building typology. Regulatory requirements. Neighborhood design. Transport and communication. Landscaping. Environmental aspects. Engineering networks.								
7.	Intellectual Property in Scientific Activity	Goal: To study the legal foundations of protecting scientific results. To develop knowledge of copyright, patenting, licensing, and commercialization of intellectual property in research. Types of intellectual property. Copyright. Patents. Licensing agreements. Commercialization. Legal regulation. Ethical aspects.	5							
8.	Innovative Approaches to Teaching Land Management in an Inclusive Educational Environment	Objective: To develop students' knowledge and skills in land management using innovative teaching methods within an inclusive educational environment, ensuring equal access to spatial thinking and professional training. Principles of inclusive education. Digital tools in land management training. Adaptation of educational materials. Working with GIS and remote sensing. Personalized learning approaches. Project tasks designed for students with special educational needs.	5							
9.	Modern problems of land management and cadastre	Purpose: The course will present modern methods and methods of land management and organization of the use of a single land fund at various administrative and territorial levels, at enterprises and organizations of various branches of the national economic complex, receipt,	5							

		collection and processing in the management of the cadastre.								
10.	Territorial planning and management	The study of the discipline is to ensure sustainable and balanced development of territories, including the development of engineering, transport, and social infrastructure based on respect for the interests of citizens and the state. Undergraduates should gain theoretical knowledge about the spatial organization of territories and the formation of the territorial environment and master the methods of studying the existing spatial structure for making decisions on planning and managing the development of territories.	5							
11.	Integrated Monitoring of Land Resources	Objective: To develop knowledge and skills in integrated monitoring of land resources using modern analysis techniques, remote sensing, and GIS technologies. Concept and objectives of integrated monitoring. Land classification. Remote sensing methods. Data collection and analysis. Land degradation assessment. Application of GIS for spatial analysis. Map creation and reporting.	5							
12.	Spatial data infrastructure	Purpose: the aim is to study the creation and development of a spatial data infrastructure that provides access to spatial data and its effective use. Content: the study of the use of geodetic and cartographic methods in solving problems of creating databases of spatial	5							

		and temporal data, environmental monitoring. The study of GIS packages, spatial data sources for solving professional tasks.								
Cycle of profile disciplines University component										
13.	Land use regulation and land economy	The study of the discipline consists in the formation of competencies in the tasks of land management, principles and systems of management of authorities, legislation and legal procedures related to the regulation of land use. Knowledge of the relationship between public sector planning and regulation and the economics of land and property. The undergraduate must be able to assess the role of the public sector in the land economy.	5							
14.	Land management expertise and regulatory legal acts of land relations	Purpose . The study of the legal foundations of the regulation of land relations, the conduct of land management expertise, as well as the analysis and application of regulatory legal acts in the field of land use. Content. Introduction to land management expertise, the regulatory framework of land relations, the procedure of land management expertise, state control and monitoring of land use, modern geographic information systems (GIS) and remote sensing of the earth in land management.	5							
15.	Remote sensing of the Earth and natural resources	Purpose: the study of the theoretical foundations and practical skills of observing the Earth's surface by ground and remote methods.	4							

		Contents: formation of remote sensing data processing skills using modern software, classification and interpretation of the results obtained, correct design of the results and preparation of accounting documentation.								
16.	Legal Support for Land Management	Objective: To study the legal foundations of land management, including regulations governing land relations, cadastral registration, and territorial planning. To develop the ability to apply land legislation in practical settings. Land law and its sources. State regulation of land use. Land Code. Cadastral and registration systems. Legal aspects of land use and permitting. Judicial practice in land-related disputes.	5							
17.	Fundamentals of Scientific Research	Objective: To develop students' foundational knowledge and skills in scientific thinking, research planning and execution, and academic writing. Concept of science and scientific method. Stages of research. Setting goals and objectives. Literature review. Data collection and analysis methods. Structure of a research paper. Basics of academic ethics and citation.	5							
18.	Monitoring of natural resources and environmental protection	The study of methods for assessing the state of natural resources, environmental monitoring systems and measures for their protection. It builds knowledge about environmental legislation, modern monitoring technologies, and principles of sustainable environmental management.	5							

		Content. Introduction to the monitoring of natural resources, methods and systems of environmental monitoring, monitoring of various environmental components, environmental protection and rational use of natural resources, modern technologies and innovations in environmental monitoring.								
19.	Geospatial data visualization	The purpose of studying the discipline is to master the methods and concept of visual representation of spatial data of mountain objects obtained as a result of surveying, geodetic measurements for making managerial decisions. Content: visualization and representation methods for mountain objects; interactive approaches to isosurface contouring for geovisualization; interpretation of spatial analysis results; modeling of virtual environments for solving professional tasks.	4							
Cycle of profile disciplines Component of choice										
20.	Digital Management of Land Resources	Objective: To introduce students to digital tools and technologies used in land resource management, enhancing efficiency and transparency of related processes. Concept of digital land use. Geographic Information Systems (GIS). Remote sensing. Digital cadastre. Electronic maps and databases. Spatial data analysis and visualization. Digital transformation in land administration.	5							

21.	WEB-GIS	Purpose: the study of theoretical and practical aspects of web GIS. Contents: formation of ideas and understandings about the concepts and technical foundations of web GIS; exploring the possibilities of web GIS technologies using ESRI products (ArcGIS online, server) and open resources (QGIS, Mapserver, Geoserver); geospatial web services, geoportals, meshes, mobile GIS, creating interactive online maps for solving problems in the field of geodesy, cartography, surveying.	5							

5. Curriculum of the educational program

WORKING CURRICULUM

Academic year	**2025-2026 (Autumn, Spring)**
Group of educational programs	**M128 - "Land Management"**
Educational program	**7M07330 - "Land use planning"**
The awarded academic degree	**Master of engineering and technology**
Form and duration of study	**full time (professional track) - 1,5 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	
									1 sem	2 sem	3 sem	
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)												
CYCLE OF BASIC DISCIPLINES (BD)												
M-1. Module of basic training (university component)												
LNG212	Foreign language (professional)		BD, UC	2	60	0/0/30	30	E	2			
MNG726	Management		BD, UC	2	60	15/0/15	30	E	2			
HUM211	Psychology of management		BD, UC	2	60	15/0/15	30	E	2			
MAP293	Automated methods of land research	1	BD, CCH	5	150	30/0/15	105	E	5			
MAP745	Modern Methods of Territorial Organization	1	BD, CCH	5	150	15/0/30	105	E	5			
MAP749	Sustainable Territorial Development	1	BD, CCH	5	150	15/0/30	105	E	5			
MAP750	Intellectual Property in Scientific Activity	2	BD, CCH	5	150	15/0/30	105	E	5			
MAP748	Innovative Approaches to Teaching Land Management in an Inclusive Educational Environment	2	BD, CCH	5	150	15/0/30	105	E	5			
MAP739	Modern problems of land management and cadastre	2	BD, CCH	5	150	15/0/30	105	E	5			
MAP277	Territorial planning and management	2	BD, CCH	5	150	15/0/30	105	E	5			
MAP744	Integrated Monitoring of Land Resources	1	BD, CCH	5	150	15/0/30	105	E		5		
MAP713	Spatial data infrastructure	1	BD, CCH	5	150	15/0/30	105	E		5		
CYCLE OF PROFILE DISCIPLINES (PD)												
M-2. Module of professional activity (university component, component of choice)												
MAP276	Land use regulation and land economy		PD, UC	5	150	15/0/30	105	E	5			
MAP736	Land management expertise and regulatory legal acts of land relations		PD, UC	5	150	15/0/30	105	E	5			
MAP265	Remote sensing of the Earth and natural resources		PD, UC	4	120	15/0/30	75	E	4			
MAP742	Legal Support for Land Management		PD, UC	5	150	15/0/30	105	E		5		
MAP746	Fundamentals of Scientific Research		PD, UC	5	150	0/0/45	105	E		5		
MAP737	Monitoring of natural resources and environmental protection		PD, UC	5	150	15/0/30	105	E		5		
MAP743	Digital Management of Land Resources	1	PD, CCH	5	150	15/0/30	105	E		5		
MAP710	WEB-GIS	1	PD, CCH	5	150	15/0/30	105	E		5		
MAP272	Geospatial data visualization		PD, UC	4	120	15/0/15	90	E			4	
M-3. Practice-oriented module												
AAP248	Internship		PD, UC	5				R		5		
M-4. Experimental research module												
AAP249	Experimental research work of a master student, including an internship and the implementation of a master's project		ERWMS	18				R			18	
M-5. Module of final attestation												
ECA213	Design and defense of the master's project		FA	8							8	
									30	30	30	

	60	30	

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	0	0	0	0
BD	Cycle of basic disciplines	0	6	15	21
PD	Cycle of profile disciplines	0	38	5	43
Total for theoretical training:		**0**	**44**	**20**	**64**
RWMS	Research Work of Master's Student				0
ERWMS	Experimental Research Work of Master's Student				18
FA	Final attestation				8
TOTAL:					**90**

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. 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	Rysbekov K. .
Department Chair - Surveying and geodesy	Meirambek G. .
Representative of the Academic Committee from Employers ___Acknowledged___	Mukhametov Y.