



Mining and Metallurgical Institute named after O.A. Baikonurov

Department of "Mining"

EDUCATIONAL PROGRAM

7M07203 - "Mining Engineering"

Code and classification of the field of education:	7M07 - Engineering, Manufacturing and Construction industries
Code and classification of training areas:	7M072 - Manufacturing and Processing industries
Group of educational programs:	M116 – Mining
The level of the NRK:	Level 7 - higher education and practical experience
ORC Level:	Level 7 - A wide range of special (theoretical and practical) knowledge (including innovative). Independent search, analysis and evaluation of professional information
Duration of training:	2 years
Volume of credits	120

Almaty, 2024

The educational program 7M07203 - "Mining Engineering" was approved at a meeting of the Academic Council of KazNRTU named after K.I. Satpayev

Protocol № 12 from « 22 » 04 2024

Considered and recommended for approval at the meeting of the Educational and Methodological Council of KazNRTU named after K.I. Satpayev

Protocol № 6 from « 19 » 04 2024

The educational program 7M07203 - "Mining Engineering" was developed by the academic committee in the direction of "Manufacturing and processing industries"

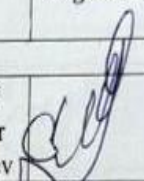
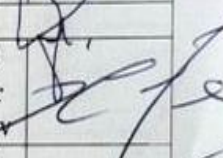
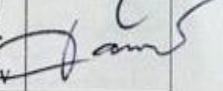
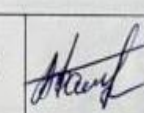
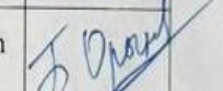
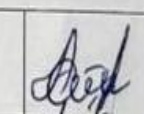

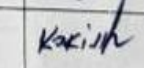
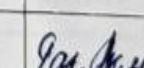
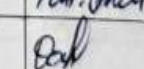
Full name	Academic degree/academic title	Post	Place of work	Signature
Chairman of the Academic Committee:				
Moldabayev Serik	Doctor of Technical Sciences, Professor	Head of the Department	KazNRTU named after K.I. Satpayev	
Teaching staff:				
Yusupov Kh.	Doctor of Technical Sciences, Professor	Professor	KazNRTU named after K.I. Satpayev	
Sandibekov Manarbek	Candidate of Technical Sciences, Associate Professor	Professor	KazNRTU named after K.I. Satpayev	
Employers:				
Amankulov Maksat		Executive Director	Antal LLP	
Orynbayev Baurzhan		Head of the BVR Parameters Department	NPP Interrin LLP	
Students:				
Assylkhanova Gulnur		2nd year doctoral student		
Assylkhanova Samal		1st year doctoral student		
Kakim Batyrbek		1st year Master's student		
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List of abbreviations and designations

NAO "Kazakh National Research Technical University named after K.I.

Satpayev" - NAO KazNITU named after K.I. Satpayev;

SCSE - The State compulsory standard of education of the Republic of Kazakhstan;

MSHE RK - Ministry of Science and Higher Education of the Republic of Kazakhstan;

EP - educational program;

IWS - independent work of a student (student, undergraduate, doctoral student);

IEST - independent work of a student with a teacher (independent work of a student (undergraduate, doctoral student) with a teacher);

WC - a working curriculum;

CED - catalog of elective disciplines;

UC - university component;

CC - component of choice;

NRK - National Qualifications Framework;

IQF - Industry qualifications framework;

LO - learning outcomes;

KC - key competencies.

1 Description of the educational program

It is intended for the implementation of specialized master's degree training in the educational program "Mining Engineering" at Satbayev University and was developed within the framework of the direction "Manufacturing and processing industries".

The educational program 7M07203 - "Mining Engineering" takes into account.

The field of professional activity of graduates who have mastered the bachelor's degree program includes:

- the bowels of the Earth, including production facilities, equipment and technical systems for their development;
- equipment and technologies for ensuring safe and effective implementation of geotechnologies for extraction, processing of solid minerals and rational use of natural resources;
- mining machines and equipment of various functional purposes (for open and underground mining);
- measures to ensure the safe operation of mining machinery and equipment and to reduce their anthropogenic impact on the environment.

Types and tasks of the graduate's professional activity

List of types of professional activity and their corresponding professional tasks:

Organizational and managerial:

- organization, planning and management of mining and construction works;
- carrying out organizational and planned calculations for the creation (reorganization) of production sites;
- development of operational work plans for production units;
- preparation of initial data for the selection and justification of scientific, technical and organizational solutions based on economic calculations.

Production and technological:

- organization of the production process during the construction, operation and reconstruction of mining enterprises, various objects on the surface and underground;
- ensuring the performance of mining and construction works in accordance with projects, technical requirements and safety rules;
- selection of equipment and materials to ensure production processes;
- efficient use of materials, equipment, algorithms and programs for the selection and calculation of process parameters.

Experimental research:

- collection and systematization of scientific and technical information of domestic and world experience in relation to solving mining production problems;
- mathematical modeling of mining production processes and mining facilities based on standard computer-aided design and research packages;
- planning, conducting experiments according to specified methods,

mathematical processing and analysis of the results.

Design and analytical:

- formation of the goals and objectives of the project (program), providing a modern level of technology for the construction, operation and reconstruction of mining enterprises;

- collection and analysis of information source data for design;

- development of design documentation for the construction, operation and reconstruction of mining enterprises;

- conducting a preliminary feasibility study of design calculations;

- implementation of projects in production and author's supervision.

The subjects of the bachelor's professional activity are the improvement of mining technology, the development and creation of new mining equipment and technology, taking into account the needs of the mining and nuclear industry of the Republic of Kazakhstan.

The specific types of professional activity for which the bachelor is mainly preparing are determined by the higher educational institution together with students, scientific and pedagogical staff of the higher educational institution and employers' associations.

The mining engineering program has been updated as part of the international project 101082621 — EMINReM — ERASMUS-EDU-2022-CBHE Master Program in Eco-Mining and Innovative Natural Resources Management (EMINReM), supported by the Erasmus+ program. It includes disciplines aimed at studying modern environmentally friendly technologies of open-pit mining and innovative methods of mineral resource management. Undergraduates gain skills in solving complex problems of optimizing production processes, rational use of resources and minimizing environmental impact.

2 The purpose and objectives of the educational program

The objectives of OP 7M07203 - "Mining Engineering" are:

- training of a highly qualified specialist in the field of solid minerals development, meeting the requirements of modern high-tech production, capable of carrying out design and production and technological activities in this field at a high technical level, engaging in organizational and managerial activities in the public and private sector, mining enterprises, nuclear industry, design, educational and scientific-research organizations of any form of ownership

- provision of training for mining enterprises of professionally educated and competent specialists capable of working in primary engineering and technical positions;

- effectively conduct the extraction of natural resources in various mining and geological and mining engineering conditions based on the study of general education, basic and specialized disciplines

- providing in-depth knowledge of natural science, general technical and economic nature as the foundation of professional education.

- formation of the graduate's theoretical knowledge and practical skills in the

field of

- formation of the graduate's skills to apply the acquired knowledge in their professional activities.

The objectives of OP 7M07203 - "Mining Engineering" are:

- study of a cycle of general education disciplines to provide social and humanitarian education based on the laws of socio-economic development of society, history, modern information technologies, the state language, foreign and Russian languages;

- the cycle of core disciplines is focused on the study of key theoretical aspects of engineering and technology to ensure the safe and effective implementation of various technologies for the extraction, processing of solid minerals and rational use of natural resources;

- study of disciplines on the development of uranium deposits, extraction of natural resources by open and underground methods based on advanced technologies, planning the construction of industrial facilities at mining enterprises and urban underground structures for various purposes;

- study of disciplines that form knowledge, skills and abilities of planning and organization of research, design of mining operations;

- familiarization with the technologies and equipment of enterprises during the period of various types of practices;

- acquisition of skills and abilities of laboratory research, technological calculations, equipment selection and design using modern computer technologies and programs.

- combining the efforts of the university and industrial enterprises to conduct scientific research, training and retraining of personnel in the field of studying the principles and patterns of functioning and development of cities and megacities, the features of anthropogenic impacts on urban environment objects, the principles of sustainable development of urbanized territories and measures of their organizational and legal support with the provision of true interdisciplinary education in these areas;

- formation of skills and abilities to choose and evaluate methods of environmental protection from anthropogenic impact in urbanized areas;

- strengthening the technological component of classical natural science education, to provide knowledge on modern technologies without lowering the bar of the level of fundamental education;

- fundamentals of the development and implementation of fundamental and applied research and R&D in the field of geological exploration and mineral processing, mining and metallurgy using new technological achievements, new generation equipment and eco-monitoring of enterprises;

- ensuring the interaction of fundamental and applied science with the educational process at all its stages, including the use of the results of joint research work in lecture courses, an experimental base for the implementation of educational research, laboratory and course work, production and pre-graduate practice;

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

The graduate of this educational program is awarded the academic degree "Master of Technical Sciences" in the direction 7M07203 - Manufacturing and processing industries (Mining Engineering).

A graduate who has mastered master's degree programs must have the following general professional competencies:

- the ability to independently acquire, comprehend, structure and use new knowledge and skills in professional activities, develop their innovative abilities;
- the ability to independently formulate research goals, establish the sequence of solving professional tasks;
- the ability to apply in practice the knowledge of fundamental and applied sections of disciplines that determine the orientation (profile) of the master's degree program;
- the ability to professionally choose and creatively use modern scientific and technical equipment to solve scientific and practical problems;
- the ability to critically analyze, present, defend, discuss and disseminate the results of their professional activities;
- proficiency in the preparation and execution of scientific and technical documentation, scientific reports, reviews, reports and articles;
- willingness to lead a team in the field of their professional activities, tolerantly perceiving social, ethnic, confessional and cultural differences;
- readiness to communicate orally and in writing in a foreign language to solve the tasks of professional activity.

A graduate who has mastered the master's degree program must have professional competencies corresponding to the types of professional activities that the master's degree program is focused on:

research activity:

- the ability to form diagnostic solutions to professional problems by integrating fundamental sections of sciences and specialized knowledge acquired during the development of the master's degree program;
- the ability to independently conduct scientific experiments and research in the professional field, generalize and analyze experimental information, draw conclusions, formulate conclusions and recommendations;
- the ability to create and explore models of the studied objects based on the use of in-depth theoretical and practical knowledge in the field of mineral deposits development, innovative technologies in the design and operation of quarries, mines, mines, capable of implementing their professional knowledge, skills and abilities in public and private management, mining enterprises, nuclear industry in design and scientific- research organizations of any form;

scientific and production activities:

- the ability to independently carry out production and scientific-production field, laboratory and interpretive work in solving practical problems;

- the ability to professionally operate modern field and laboratory equipment and devices in the field of the master's degree program;

- the ability to use modern methods of processing and interpreting complex information to solve production problems;

project activities:

- the ability to independently draw up and submit projects of research and scientific-production works;

- readiness to design complex research and scientific-production works in solving professional tasks;

organizational and managerial activity:

- readiness to use practical skills of organization and management of research and scientific-production works in solving professional tasks;

- readiness for the practical use of regulatory documents in the planning and organization of scientific and production work;

scientific and pedagogical activity:

- ability to conduct seminars, laboratory and practical classes;

- the ability to participate in the management of scientific and educational work of students in the field of development of mineral deposits.

When developing a master's degree program, all general cultural and general professional competencies, as well as professional competencies related to those types of professional activities that the master's program is focused on, are included in the set of required results of mastering the master's program.

4 Passport of the educational program

4.1 General information

№	Field name	Note
1	Code and ification of the field ucation	7M07 - Engineering, manufacturing and construction industries
2	Code and ification of training areas	7M072 - Manufacturing and processing industries
3	Group of educational programs	M116 - Mining Engineering
4	Name of the educational program	Mining Engineering
5	Brief description of ucational program	Mining operations in open-pit, underground and geotechnological mining, construction of mines and underground structures. The main technological processes: preparation of rocks for excavation, excavation and loading operations, transportation, unloading and dumping operations, primary processing of extracted minerals.
6	Purpose of the EP	The purpose of the educational program is to train a highly qualified specialist in the field of solid minerals development, meeting the requirements of modern high-tech production, able to carry out design and production and technological activities in this field at a high technical level, engage in organizational and managerial activities in the public and private sector, mining enterprises, nuclear industry, design, educational and research organizations of any form of ownership
7	Type of EP	New
8	The level of the NRK	Level 7 - higher education and practical experience
9	ORC Level	Level 7 - a wide range of special (theoretical and practical) knowledge (including innovative).
10	Distinctive features of the EP	No
11	List of competencies educational program:	
12	Learning outcomes of the educational am:	<p>1) Organize technical management of mining and blasting, as well as work to ensure the functioning of equipment and technical;</p> <p>2) Prepare technical documentation on the procedure for conducting mining, blasting, as well as work related to the primary processing of solid minerals, construction and operation of underground structures, describe the procedure for their implementation)</p> <p>3) Apply new knowledge in mathematical and physical modeling of scientific problems to be solved)</p> <p>4) Propose science-based solutions to ensure the completeness and integrated development of field reserves</p> <p>5) Develop and apply measures to improve and increase the technical level of mining, ensure the competitiveness of the</p>

		<p>6) Describe the procedure for eliminating accidents during the production and primary processing of solid minerals, as well as during the construction and operation of underground facilities;</p> <p>7) Organize your work and labor relations in a team based on modern methods, management principles, advanced production experience, technical, financial, social and personal factors;</p> <p>8) Analyze and evaluate the actions of subordinates, manage a team of performers, including in emergency situations;</p> <p>9) Plan laboratory and production experiments and evaluate their results in relation to the problem being solved</p>
13	Form of training	Full - time full
14	Duration of training	2 years
15	Volume of loans	120
16	Languages of instruction	Kazakh/Russian
17	Academic degree awarded	Master of Technical Sciences
18	Developer(s) and authors:	Moldabaev S.K.

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)								
				LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9
Cycle of basic disciplines (university component)												
1	English language (professional)	The course is designed for undergraduates of technical specialties to improve and develop foreign language communication skills in professional and academic fields. The course introduces students to the general principles of professional and academic intercultural oral and written communication using modern pedagogical technologies. The course ends with a final exam. Undergraduates also need to study independently (MIS).	5									X
2	History and philosophy of science	The subject of philosophy of science, dynamics of science, specifics of science, science and pre-science, antiquity and the formation of theoretical science, the main stages of the historical development of science, features of classical science, non-classical and post-non-classical science, philosophy of mathematics, physics, engineering and technology, specifics of engineering sciences, ethics of science, social and moral responsibility of a scientist and engineer	3									X
3	Higher school pedagogy	The course is intended for undergraduates of the scientific and pedagogical magistracy of all specialties. Undergraduates will master the methodological and theoretical foundations of higher school pedagogy, plan and organize the processes of teaching and upbringing, master the communicative technologies of subject-subject interaction between a teacher and a master in the educational process of a university.	3								X	
4	Psychology of management	The purpose of the discipline is to familiarize students with modern ideas about the role and multidimensional content of the psychological component of managerial activity; to increase the psychological culture of the future master for the successful implementation of professional activities and self-improvement. Studies the main stages, trends and trends in the development of Kazakh and foreign management psychology, the composition and structure of management activities. Special attention is paid to the psychological component of the managerial function, the individual characteristics of the manager, the ethical and cultural components of the manager, the basics of interaction.	3								X	
Cycle of basic disciplines (optional component)												
5	Introduction to cyclical Economics, economics and natural resource management	Purpose: To study resource management techniques for resource valuation, stewardship and conservation, and to develop skills in analyzing and applying cyclical approaches in business and production to minimize costs and maximize resource reuse. Content: consideration of the closed cycle through recycling, re-cycling and sustainable practices; the economics and management course focuses on managerial challenges with economic and environmental considerations through issues of resource utilization, environmental protection and good governance.	5	X		X	X		X		X	X

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6	Innovative methods of drilling and blasting operations	Purpose: mastering the methodology of research to improve the quality of rock crushing with the use of innovative technologies of rock destruction by explosion. Content: the influence of design features of explosive charges on the mechanism of action in the array of compression and reflection waves, methods of justification of parameters of drilling and blasting operations by conducting laboratory, experimental and industrial research using quantitative modeling of explosive impact on the solid rock massif and predicting the degree of crushing with a reduction in over-crushing of rocks and oversize output.	5	X	X			X	X	X		X
7	Intellectual property and research	Purpose: the goal is to train specialists who can effectively manage rights to the results of intellectual activity in the field of science, as well as ensure their legal protection and commercialization. Contents: analysis of legal protection of research and development results, methods of commercialization of scientific inventions, ethical and legal aspects of scientific activity in the context of IP.	5		X	X	X	X			X	X
8	Methods of environmental assessment and inventory for the mining industry	Purpose: to analyze the risk of accidents, to establish the degree of emergency danger of hazardous production and its components. Building an industrial safety management system at a mining enterprise based on an assessment of the risk of an accident and its possible consequences, the implementation of state supervision and local control in order to significantly reduce the risk of accidents and minimize social and economic losses. Content: Electronic inventory of mine facilities, inventory of mineral deposits and licensing activities. With the inclusion of active, closed and abandoned mine structures in the inventory. to better track the progress of specific mines from the start of operation to closure using the analytical tools of the Geographic Information System (GIS).	5	X		X	X	X		X	X	X
9	Prevention of pollution of water resources during the extraction of natural stone and ore	Purpose: To study methods and strategies to prevent water pollution in the process of natural stone and ore mining. Content: selection of technologies of extraction, processing and storage of stone materials; control over cleanliness, waste treatment and compliance with environmental standards; ecosystem protection; parameters of monoliths and blocks at their detachment from the massif are justified by the design documentation taking into account the applied technological equipment and safe working conditions.	5	X		X	X	X		X	X	X
10	Sustainable development strategies	The goal is to develop deep knowledge and competencies in the development and implementation of sustainable development strategies at various levels. The content covers a wide range of topics, ranging from global environmental challenges such as climate change, biodiversity loss and natural resource depletion, to socio-economic aspects including inequality, health and education.	5	X	X		X	X		X	X	X
11	Technology of integrated development of underground space	Purpose: application of the best practices of integrated use of underground spaces as underground industrial enterprises, engineering and transportation communications and environmental facilities in the development of technologies of integrated development of underground space and sinking of excavations with a large cross-section. Content: the main problems and tasks of integrated development of underground space of large and major cities, systematization of classifications of underground structures not related to mining, as well as the main urban planning approaches to the development of underground space;	5				X	X				X

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		analysis of the conditions of application of "high technology" underground construction in different engineering-geological, geo-ecological and urban planning conditions; interrelation of structural and volume-planning solutions of underground structures with the technology of their development in the underground space.											
12	Process regulations and mining planning	Purpose: to improve competence in ensuring compliance of mining plans with production methods, technical means, technological standards, conditions and detailed order of the technological process when implementing additional measures of production nature. Content: drawing up technological regulations for the implementation of new types of mining operations and planning of mining operations to ensure the completeness and comprehensive development of reserves of deposits in accordance with the Unified Rules for the protection of subsoil, the procedure, content and requirements for the development of technological regulations and development plan of mining operations.	5	X	X		X						X
Profile training module (university component)													
13	Problems and innovations in the technological chain of mineral resource extraction	Purpose: mastering the tools for a balanced solution to the problems of deteriorating resource endowment of mining companies and implementation of innovations to improve their current financial balance. Content: digitalization of mining business as a factor of development, use of financial markets (stock exchanges) as a source of investment for mining companies, formation of ecosystems of interaction in the mineral and raw materials sector, international cooperation in innovation on the example of mineral and raw materials sectors of highly developed and developing countries.	5	X		X		X				X	X
14	Rational technologies of vertical mining operations	Purpose: approbation of the methodology of planning the construction of vertical mine workings with the use of software products in relation to the operating conditions, selected materials and technological production schemes. Content: conducting vertical shafts of mines, fixing of mine shafts of circular cross-section with protection of fasteners from the influence of blasting, science-based solutions to the problems of construction of vertical mine workings in massifs with tectonic faults, severe fracturing and watering.	5	X	X	X	X	X			X		X
15	Digital technology in mining SMART Mine	Purpose: gaining skills in digital technologies in the mining world and organizing the environment to create a "smart mine". Content: structure and content of work on automated production of mining operations through the preparation of technical, technological, economic, financial documentation; data flows, data processing, storage and visualization, SQL and Python programming language, data collection using MES-systems, LIMS concept.	5	X	X		X	X	X				
16	Clean technologies for open-pit mining	Purpose: development of concepts of economic security, diversification with the inclusion of the path from green evolution to green economy through the development and realization of particularly advanced progressive technologies in open pit mining. Content: at the level of know-how the students get acquainted with inventions and design documentation on technological lines of steep lifting of rock mass without reducing productivity and multiple pollution of the environment; analysis of the complexities of the implementation of flow and cyclic-flow technologies, increasing the general angle of inclination of stripping workings with the use of heavy dump trucks and methods of	5	X	X		X		X	X	X		X

		mining steeply sloping layers.										
17	Highly rhythmic safe production of mining operations in deep quarries	Purpose: increasing the level of technological development of quarries by providing relatively independent production of stripping and mining works with the use of the technology of mining works in steeply sloping layers. Content: technology of ledge mining by transverse panels in steeply sloping layers, method of automated scheduling of mining operations when dividing stripping and mining operations between adjacent steeply sloping layers, safe extraction of near-contour and deep reserves on the basis of optimization of the final contours of the open pit and the use of special technological complexes in the zone of deposit reworking.	5	X	X			X	X			
18	Design of underground mines	Purpose: imparting skills of computer-aided design of underground mines and drawing up plans for development of mining operations during their operation using complex mining and geological information complexes. Content: working with database files, creating and analyzing points, strings, wireframes, digital surface models and block models, drawing underground workings, determining the optimal direction of mining development, calculating ore reserves and waste rock volumes, useful component content.	5		X			X				
19	Intensification of reclamation of lands disturbed by open mining operations	Purpose: study of methods of restoration of fertile soil layer and environmental protection measures based on the provisions on the use of limited resources with anthropogenic function of the environment, scientific aspects of mining and biological reclamation. Content: complex of technical and hydraulic engineering measures, radical reclamation on biostimulation of natural microorganisms, biological stage of reclamation on restoration of substrates after technical reclamation.	5	X	X					X		X
20	Methodology of designing of underground construction	Purpose: mastering a set of methods of designing underground structures on mining-technological, financial and economic part, labor protection and safety. Content: solving the problems of designing construction of underground structures on the basis of taking into account engineering-geological, mining-technological, structural features and ensuring the stability of structures during their operation; high technologies of construction with the use of shield tunneling complexes, New Austrian method of tunneling, chemical reinforcement of soils.	5		X			X				
21	Methods of coal mining in sections	Purpose: to improve the efficiency of mining operations at coal mines with the use of advanced methods. Content: the main production processes at coal mines, the order of mining of muld-shaped deposits and mining technology with the use of flow and cyclic-flow technology, especially with inclined coal seams, averaging and loading complexes, blasting for shaking and high ledges.	5	X	X		X	X	X			
22	Methods for assessing the risks of implementation in the field of occupational safety and industrial safety	Purpose: for future occupational health and safety professionals to develop skills in analyzing, making decisions and developing measures to ensure safety in the workplace. Content: identification of potential risks and analysis of their occurrence in the work environment, e.g. accidents, incidents, exposure to harmful factors; assessment of possible consequences for the health of employees, the environment and material assets; identification of risk mitigation measures; selection of an assessment method depending on the employer's labor and financial capabilities.	5	X	X	X		X	X		X	X
23		Purpose: realization of technological processes of construction of mines and underground	5	X		X				X		X

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	Modernization of the processes of horizontal and inclined mine workings	structures of various purposes with the use of advanced equipment and technology with intensification of construction rates. Content: technological schemes of excavations in different mining and geological conditions; types of temporary supports and linings and the technology of their construction; advanced mining and mining construction equipment and the principle of its operation; basic and auxiliary processes in the construction of underground structures.											
24	Resource-saving complex development of mineral resources	Purpose: solving the problem of depletion of subsoil reserves through full recovery and resource-saving integrated study based on the analysis of advanced technologies and cost reduction in additional separate recovery and processing of associated minerals involved in the development. Content: development planning and mine planning in integrated subsoil exploration and performing technical and economic analysis and optimization of associated minerals development based on advanced developments in this field.	5		X		X	X					
25	Technology of laying-of the developed space	Purpose: study of the latest achievements in the field of application of development systems with backfilling of excavated space. Content: reduction of costs for preparation of backfill mixture in the process of improving their characteristics (hydraulic, pneumatic, solidification, gravity and mechanical), processes of preparation of components of the backfill mixture and methods of its transportation to ensure its placement within the boundaries of the excavated space of the excavation.	5	X	X			X	X	X			
26	Technology of construction of metropolitan	Purpose: to impart skills of selection and calculation of underground structures of underground facilities on the basis of studying the methods of fixing underground structures and tunneling directed construction and installation shafts. Content: planning of the construction period, technologies and organization of construction of horizontal and inclined excavations, tunnels with the help of tunnel boring shields, technological schemes of construction of subway facilities, including three-vaulted.	5	X	X	X					X		

5 The curriculum of the educational program

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APPROVED
Chairman of the Management Board-
Rector of KazNTU named after K.Satpayev
M.M. Begentaev
2024 y.

CURRICULUM
of Educational Program on enrollment for 2024-2025 academic year

Educational program 7M07203 - "Mining Engineering"
Group of educational programs M116 - "Mining Engineering"

Discipline code	Name of disciplines	Cycle	Total amount in credits	Total hours	Classroom amount lec/lab/pr	SIS (including TSIS) in hours	Form of control	Allocation of face-to-face training based on courses and semesters			
								1 course		2 course	
								1 semester	2 semester	3 semester	4 semester
CYCLE OF BASIC DISCIPLINES (BD)											
M-1. Module of basic training (university component)											
LNG213	Foreign language (professional)	BD UC	5	150	0/0/3	105	E	3			
HUM214	Management Psychology	BD UC	3	90	1/0/1	60	E	3			
HUM212	History and philosophy of science	BD UC	3	90	1/0/1	60	E		3		
HUM213	Higher school pedagogy	BD UC	3	90	1/0/1	60	E		3		
Component of choice											
Module methods of scientific research											
MIN258	Innovative methods of drilling and blasting operations	BD CCH	5	150	2/0/1	105	E	5			
MIN709	Introduction to the circular economy, economics and management of natural resources										
MNG781	Intellectual Property and Research										
MIN280	Process regulations and mining planning	BD CCH	5	150	2/0/1	105	E	5			
MIN707	Environmental assessment and inventory techniques for mining industry										
MNG782	Sustainable development strategies										
MIN278	Technology of integrated development of underground space	BD CCH	5	150	2/0/1	105	E		5		
MIN708	Prevention of the water resources contamination in the extraction of natural stone and ore										
CYCLE OF PROFILE DISCIPLINES (PD)											
M-2. Module of professional activity (university component, component of choice)											
Mining Production Support Module											
MIN268	Digital technology in mining SMART Mine	PD UC	5	150	1/0/2	105	E	5			
MIN710	Problems and innovations in the process chain of mineral resources	PD UC	5	150	2/0/1	105	E	5			
MIN297	Rational technologies of vertical mining operations	PD UC	5	150	2/0/1	105	E		5		
MIN711	Clean technologies for open-pit mining	PD UC	5	150	2/0/1	105	E			5	
Module for implementing innovations in mining											
MIN273	Design of underground mines	PD CCH	5	150	2/0/1	105	E			5	
MIN211	Methodology of designing of underground construction										
MIN253	Technology of construction of metropolitan										
MIN285	Modernization of the processes of horizontal and inclined mine workings	PD CCH	5	150	2/0/1	105	E		5		
MIN700	Highly rhythmic safe production of mining operations in deep quarries	PD CCH	5	150	2/0/1	105	F		5		

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named after K.I.SATBAYEV»

MIN701	Intensification of reclamation of lands disturbed by open mining operations												
MIN295	Technology of laying-of the developed space	PD CCH	5	150	2/0/1	105	E	5					
MIN712	Implementation risk assessment methods for occupational health and safety												
MIN298	Resource-saving complex development of mineral resources	PD CCH	5	150	2/0/1	105	E	5					
MIN294	Methods of coal mining in sections												
M-3. Practice-oriented module													
AAP273	Pedagogical practice	BD UC	8								8		
AAP274	Research practice	PD, CCH	8									8	
M-4. Experimental research module													
AAP268	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	7						4				
AAP268	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	4							4			
AAP251	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	2								2		
AAP255	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	14									14	
M-5. Module of final attestation													
ECA212	Preparation and defense of a master's thesis	FA	8									8	
Total based on UNIVERSITY:										30	30	30	30
										60	60	60	60

Number of credits for the entire period of study				
Cycle code	Cycles of disciplines	Credits		
		university component (UC)	component of choice (CCH)	Total
BD	Cycle of basic disciplines	20	15	35
PD	Cycle of profile disciplines	28	25	53
	Total for theoretical training:	0	48	88
	RWMS			24
FA	Final attestation	8		8
	TOTAL:	8	48	120

Decision of the Academic Council of Kazntu named after K.Satpayev. Protocol №12 or "22" 04 2024 y.

Decision of the Educational and Methodological Council of Kazntu named after K.Satpayev. Protocol №6 or "19" 04 2024 y.

Decision of the Academic Council of the Mining and Metallurgical Institute. Protocol №8 or "12" 04 2024 y.

Vice-Rector for Academic Affairs

Director of the Institute of Mining and

Head of the Department "Mining"

Council representative from employers

R. Uskenbayeva

K. Rysbekov

S. Moldabayev

B. Bakhramov

Change registration sheet

Sequence number of the change	Section, paragraph of the document	Type of change (replace, cancel, add)	Number and date of notification	The change has been made	
				Date	Surname and initials, signature, position

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Жобалау және консалтинг фирмасы



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№ _____

на № 34 от 1.06.2024г.

Рецензия

на образовательную программу «7M07203-Горная инженерия» (научно-педагогическое направление) со сроком обучения 2 года
НАО «Казахский национальный исследовательский технический университет им. К. Сатпаева»

Образовательная программа 7M07203 - «Горная инженерия» направлена на подготовку высококвалифицированных специалистов, предоставляя углубленные знания и практические навыки в области разработки твердых полезных ископаемых. Программа охватывает ключевые направления: открытая и подземная добыча руды, строительство шахт и подземных сооружений, а также геотехнологии подземного скважинного выщелачивания урана.

Программа способствует формированию компетенций в таких областях, как техническое руководство горными и взрывными работами, строительство и эксплуатация объектов горного производства, управление производственными процессами. Также магистранты приобретают навыки организации и проведения научно-исследовательских работ с использованием современных программных комплексов и технических средств, применяемых в лабораторных и опытно-промышленных испытаниях.

Актуальность программы обусловлена современными тенденциями горнодобывающей и обрабатывающей промышленности, где происходит переход на новый технологический уровень в рамках концепции Индустрии 4.0. В образовательной программе эта концепция реализуется через изучение интегрированных информационных систем для планирования и проектирования горных работ, а также программ геомеханических расчетов, что направлено на реализацию государственной программы «Цифровой Казахстан».

Особенно стоит отметить внедрение в учебный процесс ряда инновационных дисциплин, соответствующих актуальным требованиям науки и производства. Это включает в себя дисциплины, охватывающие следующие темы: SMART-рудник, методология непрерывного проектирования горнодобывающих предприятий, проектирование горных выработок, высокоритмичное безопасное производство горных работ на глубоких горизонтах, модернизация горных выработок и ресурсосберегающее освоение недр.

Уникальность программы также подтверждается ее соответствием международным стандартам образования. Программа полностью соответствует

Европейской рамке квалификаций высшего образования (<https://ecahe.eu/>) и Дублинским дескрипторам, что свидетельствует о высоком уровне подготовки специалистов.

Таким образом, анализ образовательной программы «7M07203 - Горная инженерия» в Satbayev University демонстрирует ее соответствие современным требованиям индустрии и международным образовательным стандартам, обеспечивая выпускникам необходимые компетенции для успешной работы в горнодобывающей отрасли.

Исполнительный директор



М.Б. Аманкулов



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Рецензия

на образовательную программу 7М07203- «Горная инженерия»
(научно-педагогическое направление) со сроком обучения 2 года
НАО «Казахский национальный исследовательский технический
университет им. К. Сатпаева»

Анализ образовательной программы (ОП) 7М07203 -Горная инженерия по подготовке магистров техники и технологии в Satbayev University показывает, что она в полном объеме соответствует Болонской системе, согласно которой осуществляется обучение в европейских странах.

Ключевым трендом в горнодобывающей и обрабатывающей промышленности в настоящее время является переход на новый технологический уровень в соответствии с концепцией Индустрии 4.0. В данной образовательной программе эта концепция реализуется через изучение студентами ряда прогрессивных дисциплин, направленных на получение навыков использования востребованных, на современных высокотехнологизированных горных предприятиях, ряда информационных программ и модулей, в соответствии с Государственной программой «Цифровой Казахстан».

Сфера деятельности выпускников по ОП 7М07203 - «Горная инженерия» - будущие руководители предприятий по добыче твердых полезных ископаемых (золото, медь, железо, полиметаллы, уран и многие другие). С учетом увеличения в мире спроса на минеральное сырье и огромного количества в Казахстане горнодобывающих предприятий востребованность в специалистах горного профиля будет оставаться на достаточно высоком уровне.

Подготовка по ОП Горная инженерия магистров ведется на кафедре «Горное дело» по 4 траекториям обучения: Открытая разработка месторождений, Подземная разработка месторождений, Строительство шахт и подземных сооружений (в том числе метростроителей), Подземное скважинное выщелачивание урана (по объемам добычи урана в мире Казахстан занимает 1 место).

По всем траекториям обучения выпускники смогут работать на первичных инженерно-технических должностях и эффективно вести добычу природных ресурсов открытым и подземным способами на основе передовых технологий и современного горнотранспортного оборудования. Предприятия открытым способом разработки – карьеры – оснащены

высокопроизводительным горным и транспортным оборудованием. Автоматизированное управление технологическими процессами на крупных рудниках осуществляется с использованием передовых цифровых технологий и элементов искусственного интеллекта - «Умный рудник».

Содержание ОП «Горная инженерия» направлено на максимальное удовлетворение запросов потребителей на основе развития многоуровневой системы подготовки кадров, фундаментальности и качества обучения, непрерывности и преемственности образования и науки, единства обучения, воспитания, исследовательской и инновационной деятельности, получение полноценного и качественного профессионального образования в области разработки месторождений полезных ископаемых, подтвержденного уровнем знания и умения, навыков и компетенций, на основе установленных государственным общеобразовательным стандартом критериев, их оценки, как по содержанию, так и по объёму.

В итоге образовательная программа обеспечит подготовку магистров для горнорудной промышленности, знающих технологию, комплексную " механизацию, организацию и экономику горного производства, современные методы и принципы его совершенствования и проектирования.

**Начальник отдела параметров БВР
ТОО НПП «Интеррин»**



Б.А. Орынбаев