Mining and Metallurgical Institute named after O.A. Baikonurov
Department of "Mining"

EDUCATIONAL PROGRAM
"8D07203 - Mining Engineering"

Code and classification of the field of education:	8D07 – Engineering, manufacturing and construction industries
Code and classification of training areas:	8D072 – Manufacturing and processing industries
Group of educational programs:	D116 – Gornoye delo i dobycha poleznykh iskopayemykh
The level of the NRK:	Level 8 – Postgraduate education (programs leading tothe academic degree of Doctor of Philosophy (PhD) and doctors in the profile and/or practical experience)
ORC Level:	Level 8 – Knowledge at the most advanced level in the field of science and professional activity

Duration of training:	3 years
Volume of loans:	180

Almaty, 2024

The educational program 8D07203 - "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 8D07203 - "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
Chatiman 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		
Ragyt Akmonshak		4th year student		
Oskenbayev Adilet		4th year student		

Table of contents

List of abbreviations and designations

NAO "Kazakh National Research Technical University named after K.I.Satpayev" – NAO KazNITU named after K.I.Satpayev;

SES – The State compulsory standard of education of the Republic of Kazakhstan;

MES RK – Ministry of Education and Science of the Republic of Kazakhstan;

OP – educational program;

SRO – independent work of a student (student, undergraduate, doctoral student);

SROP – independent work of the student with the teacher (independent work of the student (master's student, doctoral student) with the teacher);

RUP – working curriculum;

CAD – catalog of elective disciplines;

VK – university component;

KV – component of choice;

NRK – National Qualifications Framework;

ORC – Industry qualifications framework;

RO – learning outcomes;

CC – key competencies.

1 Description of the educational program

The educational program for the preparation of a Doctor of Philosophy (PhD) has a scientific and pedagogical orientation and assumes fundamental educational, methodological and research training and in-depth study of disciplinesin the relevant fields of sciences for the system of higher and postgraduate education and the scientific sphere.

The educational program for the preparation of a doctor in the profile involves fundamental educational, methodological and research training and in- depth study of disciplines in the relevant areas of science for the branches of the national economy, the social sphere: education, medicine, law, art, economics, business administration and in the field of national security and military affairs.

The educational programs of doctoral studies in terms of professional training are developed on the basis of studying the experience of foreign universities and research centers that implement accredited training programs for PhD doctors or doctors in the profile.

The content of the educational program of the profile doctoral program is determined by the university independently.

The main criterion for the completion of the educational process for the preparation of doctors of philosophy (PhD) (doctors in the profile) is the development of at least 180 academic credits by a doctoral student, including all types of educational and scientific activities.

The duration of doctoral studies is determined by the amount of academic credits mastered. Upon mastering the established amount of academic credits and achieving the expected learning outcomes for obtaining a Doctor of Philosophy (PhD) degree or by profile, the educational program of the doctoral program is considered fully mastered.

The content of the doctoral program consists of:

1) theoretical training, including the study of cycles of basic and core disciplines;

2) practical training of doctoral students: various types of practices, scientific or professional internships;

3) research work, including the execution and defense of a PhD thesis;

4) final certification.

The training of personnel in doctoral studies is carried out on the basis of educational programs of doctoral studies in two directions:

1) scientific and pedagogical with a training period of at least three years;

2) profile with a training period of at least three years.

The content of the OP "Mining Engineering" on the basis of the development of a multi-level system of personnel training, the fundamental nature and quality of training, continuity and continuity of education and science, unity of training, education, research and innovation activities aimed at maximum satisfaction of consumer needs should ensure:

- obtaining a full-fledged and high-quality professional education in the field

of mineral deposits development (MPI), confirmed by the level of knowledge and skills, skills and competencies, based on the criteria established by the State Educational Standard, their assessment, both in content and in volume:

- training of professional and competitive specialists in the field of MPI development and creation of new mining production technologies and production management;
- using methods of analysis and evaluation of experimental results.

2 The purpose and objectives of the educational program

The purpose of this educational program is to create, based on the integration of education and science, an effective system of training scientific, scientific and pedagogical personnel of a new formation capable of solving issues of improving society, economy, production, science and the development of new technologies and the implementation of the educational process in accordance with the principles of international practice of training highly qualified scientific and pedagogical personnel, competitive in the modern labor market

The goal reflects the desire to ensure high-quality training through the integration of education, science and production, strengthening the material and technical base and human resources of the university, the use of modern methods and technologies in the educational process. The training involves serious research work, the performance of which significantly increases the status of a doctoral student as a young scientist in his field.

The tasks of OP 8D07203 – "Mining Engineering" are:

- preparation of PhD doctors who are competitive both within the country and on the international labor market, integration of national doctoral programs into the global educational space;
- monitor, analyze and evaluate the actions of subordinates, manage a team of performers, including in emergency situations;
- to carry out work on the improvement of production activities, the development of projects and programs for the development of the enterprise (divisions of the enterprise);
- analyze the processes of mining, mining and construction industries and complexes of used equipment as control objects;
- plan and carry out theoretical, experimental and laboratory studies, process the results obtained using modern information technologies;
- to carry out patent search, to study scientific and technical information, domestic and foreign experience on the subject of research;
- to develop models of processes, phenomena, to evaluate the reliability of the constructed models using modern methods and means of information analysis;
- to carry out a technical and economic assessment of deposits of solid minerals and underground construction facilities, the efficiency of the use of technological equipment;
- perform calculations of technological processes, productivity of technical

means of complex mechanization of works, throughput of transport systems of mining enterprises, make schedules of work organization and calendar plans for the development of production;

- substantiate design decisions to ensure industrial and environmental safety, economic efficiency of production facilities for operational exploration, extraction and processing of minerals, during the construction and operation of underground facilities;

- develop the necessary technical documentation as part of creative teams and independently;

- independently draw up projects and passports of mining and drilling and blasting operations;

- to carry out the design of enterprises for the extraction and processing of solid minerals, as well as the construction of underground facilities using modern information technologies.

3 Requirements for evaluating the learning outcomes of an educational program

Persons who have mastered the educational program of doctoral studies and defended a doctoral dissertation, with a positive decision of the dissertation councils of a university with a special status or the Committee for Control in the Field of Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan, according to the results of the examination, are awarded the degree of Doctor of Philosophy (PhD) or doctor in profile and a state-issued diploma with an appendix (transcript). Persons who have received a PhD degree, in order to deepen scientific knowledge, solve scientific and applied problems on a specialized topic, perform a postdoctoral program or conduct scientific research under the guidance of a leading scientist of the chosen university.

Students have direct access to CAT, curricula, syllabuses, which are posted on the university's website, and also have the opportunity to get acquainted with presentations of academic disciplines posted on the university's website and departments.

The cycle of basic disciplines is the foundation of professional education.

The purpose of the cycle of specialized disciplines is to provide deep theoretical knowledge and practical application of special engineering knowledge.

Requirements for the key competencies of doctoral graduates:

1) have an idea:

- about the main stages of development and paradigm shift in the evolution of science;

- on the subject, ideological and methodological specifics of the natural (social, humanitarian, economic) sciences;

- about scientific schools of the relevant branch of knowledge, their theoretical and practical developments;

- about scientific concepts of world and Kazakh science in the relevant field;

- on the mechanism of implementation of scientific developments in practical activities;
- on the norms of interaction in the scientific community;
- about the pedagogical and scientific ethics of a research scientist.

2) know and understand:

- current trends, trends and patterns of development of Russian science in the context of globalization and internationalization;
- methodology of scientific knowledge;
- achievements of world and Kazakh science in the relevant field;
- (to realize and accept) the social responsibility of science and education;
- perfect foreign language for scientific communication and international cooperation.

3) be able to:

- to organize, plan and implement the process of scientific research;
- analyze, evaluate and compare various theoretical concepts in the field of research and draw conclusions;
- analyze and process information from various sources;
- conduct independent scientific research, characterized by academic integrity, based on modern theories and methods of analysis;
- generate your own new scientific ideas, communicate your knowledge and ideas to the scientific community, expanding the boundaries of scientific knowledge;
- plan and predict your further professional development.

4) have skills:

- critical analysis, evaluation and comparison of various scientific theories and ideas;
- analytical and experimental scientific activities;
- planning and forecasting of research results;
- public speaking and public speaking at international scientific forums, conferences and seminars;
- scientific writing and scientific communication;
- planning, coordination and implementation of scientific research processes;
- a systematic understanding of the field of study and demonstrate the quality and effectiveness of the selected scientific methods;
- participation in scientific events, fundamental scientific domestic and international projects;
- leadership management and team management;
- responsible and creative attitude to scientific and scientific-pedagogical activity;
- conducting patent search and experience in the transfer of scientific information using modern information and innovative technologies;
- protection of intellectual property rights to scientific discoveries and developments;
- free communication in a foreign language;

5) be competent:

- in the field of scientific and scientific-pedagogical activity in the conditions of rapid updating and growth of information flows;
- in carrying out theoretical and experimental scientific research;
- in the formulation and solution of theoretical and applied problems in scientific research;
- to conduct a professional and comprehensive analysis of problems in the relevant field;
- in matters of interpersonal communication and human resource management;
- in matters of university training of specialists;
- in the examination of scientific projects and research;

Requirements for the research of a student under the Doctor of Philosophy (PhD) program:

1) compliance with the main problems of the educational program of the doctoral program on which the doctoral dissertation is being defended;

2) relevant and contains scientific novelty and practical significance;

3) based on modern theoretical, methodological and technological achievements of science and practice;

4) is based on modern methods of data processing and interpretation using computer technology;

5) performed using modern methods of scientific research;

6) contains research (methodological, practical) sections on the main protected provisions.

The practice is conducted in order to form practical skills of scientific, scientific, pedagogical and professional activities.

The educational program of the doctoral program includes:

1) pedagogical and research practice – for students of the PhD program;

2) industrial practice – for students in the program of specialized doctoral studies.

During the period of pedagogical practice, doctoral students, if necessary, are involved in conducting classes in bachelor's and master's degrees.

The doctoral student's research practice is conducted in order to study the latest theoretical, methodological and technological achievements of domestic and foreign science, as well as to consolidate practical skills, apply modern research methods, process and interpret experimental data in dissertation research.

The doctoral student's industrial practice is carried out in order to consolidate the theoretical knowledge gained in the course of training and improve the professional level.

The content of research and production practices is determined by the topic of the doctoral dissertation.

Students complete the internship program, keep diaries, observe the rules of labor regulations at the places of internship, study and follow the rules of TB. At the end of the practice, they provide the head of the practice with a report on the practice, a written diary and defend the report on the practice in due time.

4 Passport of the educational program

4.1 General information

№	Field name	Note
1	Code and classification of the field of education	8D07 – Engineering, manufacturing and construction industries
2	Code and classification of training areas	8D072 – Manufacturing and processing industries
3	Group of educational programs	D116 – Gornoye delo i dobycha poleznykh iskopayemykh
4	Name of the educational program	Mining Engineering
5	Brief description of the tional program	The training involves serious research work, the performance of which significantly increases the status of a doctoral student as a young scientist in his field
6	Purpose of the EP	The purpose of this educational program is to create, on the basis of the integration of education and science, an effective system of training scientific, scientific and pedagogical personnel of a new formation capable of solving issues of improving society, economy, production, science and the development of new technologies and the implementation of the educational process in accordance with the principles of international practice of training highly qualified scientific and pedagogical personnel, competitive in modern the labor market
7	Type of EP	New
8	The level of the NRK	Level 8 – Postgraduate education (programs leading to the academic degree of Doctor of Philosophy (PhD) and doctors in the profile and/or practical experience)
9	ORC Level	Level 8 – Knowledge at the most advanced level in the field of science and professional activity
10	Distinctive features of the EP	No
11	List of competencies of ducational program:	1) To carry out work on the improvement of production activities, the development of projects and programs for the development of an enterprise (divisions of an enterprise); 2) To analyze the processes of mining, mining-construction industries and the complexes of the equipment used as control objects; 3) Plan the implementation of theoretical, experimental and laboratory studies with the processing of the results obtained using modern information technologies; 4) Perform patent search, analyze scientific and technical information, domestic and foreign experience on research topics; 5) Develop models of processes, phenomena, evaluate the reliability of the constructed models using modern methods and tools for information analysis; 6) Prepare a technical and economic assessment of solid mineral sits and underground construction facilities, the effectiveness of the use ocess equipment; 7) Make calculations of technological processes, the productivity of ical means of complex mechanization of work, the throughput of port systems of mining enterprises, offer schedules for the organization
12	Learning outcomes of the educationalprogram:	

		rk and calendar plans for the development of production; 8) Evaluate design solutions to ensure industrial and environmental , economic efficiency of production facilities for operational ration, mining and processing of minerals, during the construction and tion of underground facilities; 9) Design enterprises for the extraction and processing of solid als, as well as the construction of underground facilities using modern mation technologies; 10) Plan the development parameters of a mining enterprise
13	Form of training	Full - time full
14	Duration of training	3 years
15	Volume of loans	180
16	Languages of instruction	Kazakh/Russian
17	Academic degree awarded	Doctor of PhD
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	LO10
Cycle of basic disciplines M-1. Basic training module (university component)													
1	Academic writing	The course is aimed at developing academic writing skills and writing strategies for doctoral students in the field of engineering and natural sciences. The course focuses on the basics and general principles of academic writing for; writing effective sentences and paragraphs; using tenses in scientific literature, as well as styles and punctuation; writing abstracts, introductions, conclusions, discussions, conclusions, literature and resources used; quoting in the text; preventing plagiarism, and making presentations at a conference	5		X	X	X	X	X		X		
2	Research methodology	The course contributes to the formation of knowledge about the methods, methodology of scientific research, methods of collecting and processing scientific data, the principles of the organization of scientific research, the role of technical sciences, computer science and engineering research in modern science. The structure of technical sciences, the application of general scientific, philosophical, special methods of scientific research in theory and in practice are considered	5		X	X	X	X	X				X
Component of choice													
3	Geotechnical support for the development of underground space	The course is aimed at solving the problems of developing underground space on the basis of world experience in their integrated use, modern methods of sinking underground mine workings, taking into account the requirements for the safety of the mined-out space of mines and mines and for environmental facilities	5	X	X	X	X	X	X	X	X		X
4	Managing the spatial position of the contours of deep quarries	The course is aimed at mastering the skills of establishing the optimal spatial position of the final and current contours of a quarry on digital models of deposits using integrated mining and geological information systems based on the developed methods: nonlinear in justifying the design parameters of the pit walls, Bellman optimal control in dynamic programming for uniform distribution of the ore body along the perimeter of the open pit	5		X	X	X	X	X	X	X	X	X
5	The development of the theory and design methods of drilling and blasting operations in the development of	The course is aimed at studying modern approaches to the theory of explosion action in the destruction of heterogeneous rock masses and developing on its basis effective methods for designing drilling and blasting operations in open and underground mining of mineral deposits that provide the required degree of crushing with minimization of	5			X	X	X		X	X	X	X

	mineral deposits	oversized output											
Cycle of profile disciplines M-2. Profile training module (optional component)													
6	Innovative technologies for the extraction of uranium by in-situ leaching	The course is aimed at solving the problems of developing underground space on the basis of world experience in their integrated use, modern methods of sinking underground mine workings, taking into account the requirements for the safety of the mined-out space of mines and mines and for environmental facilities	5	X	X	X	X	X		X	X	X	X
7	Scientific support of technical solutions for underground mining processes	Problems, prospects of development of the mining industry and scientific support of new technological solutions in the processes of underground mining of ore and non-metallic minerals	5		X	X	X	X	X	X	X	X	X
8	Automated design and production of mass explosions in open pits	The course is aimed at mastering software modules for automated design and production of mass explosions in open pits. The set of software modules "Graunulometric composition of natural fragments in a rock mass", "Dimensions of zones of intensive crushing of rocks", "Rational parameters for the location of charges in a ledge", "Graunulometric composition of the blasted rock mass", "Participation of heterogeneous rocks in the collapse" is an information and experimental a platform for controlling the process of destruction of rocks by the action of an explosion in quarries	5	X		X		X		X	X	X	
9	Physico-chemical geotechnology	The course is aimed at studying physical and chemical geotechnology as a science that consistently reveals the stages of its formation, various methods for processing certain natural resources in the bowels of the Earth, and physical and geological factors that determine the efficiency of mining a deposit in an innovative way	5			X	X	X	X		X		
10	Designing the combined development of mineral deposits	The course is aimed at mastering design skills during the transition from open to underground mining of mineral deposits, in particular, establishing the parameters of an open-underground layer, which determines the effectiveness of a safe transition to an underground method with the construction of underground workings. At the same time, the geomechanical substantiation of the maximum height of the open-underground layer and the thickness of the pillar left between the open and underground workings serve as the basis for the expedient use of the combined method of developing deep deposits	5	X	X	X			X	X	X	X	X
11	Scientific substantiation of the construction of special underground structures	The course is aimed at familiarization with special methods of construction of underground structures in difficult mining and geological conditions, including special methods of production and organization of mining operations and technical support for their safe implementation, numerical volumetric modeling of the stress-strain state of a rock mass near a mine working, taking into account the presence of tectonic faults, karst cavities, watering and strong fracturing.	5		X	X	X	X	X	X	X	X	X

5 Curriculum of the educational program

KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K.I.SATPAYEV

SATBAYEV UNIVERSITY

APPROVED
Chairman of the Management Board -
Rector of KazNRTU named after K.I.Satpayev
M.M. Beisulaev
2024 г.

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

Educational program 8D07203 - "Mining Engineering"
Group of educational programs D116 - "Mining Engineering"

Form of study: full-time **Duration of study: 3 year** **Academic degree: Doctor PhD**

Discipline code	Name of disciplines	Cycle	Total volume in Academic classes	Total amount in Academic 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					
									I course		2 course		3 course	
									1 semester	2 semester	3 semester	4 semester	5 semester	6 semester
CYCLE OF BASIC DISCIPLINES (BD)														
M-1. Module of basic training (university component)														
MET322	Scientific research methods	BD UC	3	5	150	2/0/1	105	E	5					
LNG305	Academic writing	BD UC	3	5	150	0/0/3	105	E	5					
Component of choice														
MIN313	Innovative technologies for the extraction of uranium by in-situ leaching	BD CCH	3	5	150	2/0/1	105	E	5					
MIN324	Management of the spatial position of the contours of deep quarries													
MIN311	The development of the theory and design methods of drilling and blasting operations in the development of mineral deposits													
MNG349	Intellectual property and the global market													
CYCLE OF PROFILE DISCIPLINES (PD)														
M-2. Module of professional activity (component of choice)														
MIN313	Geotechnical support for the development of underground space	PD, CCH	3	5	150	2/0/1	105	E	5					
MIN315	Scientific support of technical solutions for underground mining processes													
MIN316	Automated design and production of mass explosions in open pits													
MIN317	Physico-chemical geotechnology	PD, CCH	3	5	150	2/0/1	105	E	5					
MIN320	Designing the combined development of mineral deposits													
MIN319	Scientific substantiation of the construction of special underground structures													
M-3. Practice-oriented module														
AAP350	Pedagogical practice	BD UC	10	10						10				
AAP355	Research practice	PD UC	10	10							10			
M-4. Experimental research module														
AAP336	Research work of a doctoral candidate, including internships and completion of a doctoral dissertation	RWDS UC	5	5					5					
AAP347	Research work of a doctoral candidate, including internships and completion of a doctoral dissertation	RWDS UC	40	40						20	20			
AAP356	Research work of a doctoral candidate, including internships and completion of a doctoral dissertation	RWDS UC	60	60								30	30	
AAP348	Research work of a doctoral candidate, including internships and completion of a doctoral dissertation	RWDS UC	18	18										18
M-5. Module of final attestation														
ECA303	Writing and defending a doctoral dissertation	FA	12	12										12
Total based on UNIVERSITY:									30	30	30	30	30	30
									60		60		60	

Cycle code	Cycles of disciplines	Credits			
			university component (UC)	component of choice (CCH)	Total
BD	Cycle of basic disciplines		20	5	25
PD	Cycle of profile disciplines		10	10	20
	Total for theoretical training:	*0*	*30*	*15*	*45*
	RWDS				*123*
FA	Final attestation	12			12
	TOTAL:	12	30	15	180

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

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

Decision of the Academic Council of the Mining and Metallurgical Institute. Protocol № 8 от "17" 04 2024 y.

Vice-Rector for Academic Affairs _____ R.Uskenbayeva

Director of the Institute of Mining and Metallurgical _____ K. Ryskekov

Head of the Department "Mining" _____ S. Moldabayev

Council representative from employers _____ B. Bakhramov