NCJSC «Kazakh National Research Technical University after K.I.Satpayev»

Mining and metallurgical Institute named after |O.A. Baykonurov

Mining department

EDUCATIONAL PROGRAM

«MINING ENGINEERING»
(profile direction (1,5 years)

Master of technics and technology by educational program
7M07214 – «Mining engineering»

2nd issue
According to GSOE of higher education of 2018

Almaty 2021

The program is drawn up and signed by the parties:

From KazNRTU named after K.I. Satbayev

Director of the mining and metellurgical Instiiute named after O.A. Baykonurov — Rysbekov K.B.

Head of the Department of Mining — Moldabayev S.K.

Chair of the TG of the department, professor — Sandibekov M.N.

From the employer:

1. Member of the Board of Directors of Kazakhaltyn Mining and Metallurgical Concern JSC, e[pert of Kazakhmys Corporation LLP, doctor of technical sciences, professor Bitimbaev M.Zh.;

2. Director of the inctitute of Mining named after D.A.Kunaev, doctor of technical sciences, professor Buktukov N.S.;

3. Vice president of LSC "Altynaimas" Bachramov B.A.

Approved at the meeting of the Academic Council of Kazakh national research technical university named after K.I. Satbayev. Protocol №3 of 25.06.2021

Qualification:

7M – educational level according to the National Qualifications Framework

07 – Engineering, manufacturing and construction industries

072 – Manufacturing and processing industries (master)

Academic degree: master of engineering and technology (profile direction)

Study period: 1.5 year

Professional competence:

Prossession of skills in organizing experimental research work, use the technikal means of experimental-industrial testing of equipment and technologies in the extraction, processing of solid minerals, construction and operation of underground facilities, readiness to carry out experimental and laboratory research, interpret the results obtained, draw up and protect reports.

Content

1 Regulatory references

Table 1 – List of regulatory and other documents referenced in the document

№	Document title	Storage
1	Law of the Republic of Kazakhstan" On Education " with amendments and additions within the framework of legislative changes to increase the independence and autonomy of universities dated 04.07.18 No. 171-VI.	Office of Registrar (OR) http://online.zakon.kz/Document/?doc_id=30118747
2	State mandatory standard of Higher education (Annex 7 to the Order of the Minister of Education and Science of the Republic of Kazakhstan No. 604 dated 31.10.18	OR http://online.zakon.kz
3	The European qualifications framework for higher education	OR http://ecahe.eu/w/images/7/76/A_Framework_for_Qualifications_for_the_European_Higher_Education_Area.pdf
4	Dublin Descriptors	http://ecahe.eu/w/index.php/Dublin_Descriptors
5	GOST 3.1105-2011 Unified System of technological documentation (ESTD). Forms and rules for processing general-purpose documents.	http://online.zakon.kz/document/?doc_id=31194118
6	Regulatory documents KazNTU.	Internal Audit Department

2 List of abbreviations. Terms and definitions

Table 2-Abbreviations used

Abbreviation	Full title
ECTS	European Credit Transfer and Accumulation System
KazNRTU, University	NAO "Kazakh National Research Technical University named after K.I. Satpayev", Satbayev University
MES RK	Ministry of Education and Science of the Republic of Kazakhstan
TS	Teaching staff
EP	Educational program
OR	Office of Registrar's
WSP	Working curriculum of the EP

Table 3-Terms and definitions used in the text of the document

Term	Definition
Dublin descriptors	An integral part of the European Framework of Higher Education Qualifications describing the degree of development of competencies
Competency	The ability of students to apply the knowledge, skills and abilities acquired in the course of training in professional activities
Audit	Qualitative characteristics of the student assessment system
Credit Education	Training based on the choice and independent planning of the sequence of studying disciplines by the student using credit as a unified unit of measurement of the amount of academic work of the student and the teacher
Matrix of Competencies	Based on the Dublin descriptors describing the depth of development of competencies within the framework of the OP
Cycle	Segment of the development and depth of the student's development of competencies that have an intermediate completed cycle
Educational program	Description of the educational process based on achievements learning outcomes and competencies for obtaining a recognized diploma in a particular field of professional activity
Curriculum	A document containing a complete list of academic disciplines of the mandatory component and the elective component, indicating the number of credits, the sequence of studying disciplines, types of training sessions and forms of control
Framework of Competencies	Based on Dublin descriptors describing the depth of competence development
Outcome results	Knowledge, skills, skills, qualification characteristics, competence

3 Short description of the program:

1) Purpose of the educational program is to prepare highly qualified specialists in the field of development of solid minerals that meet the requirements of modern high-tech production, capable to carry out at a high technical level of design and technological activities in the field, to engage in management activity in the public and private sector, mining companies, nuclear industry, in the design organizations of any form of ownership.

2) Types of professional activities are:

- *in the field of experimental research activities;*
- *in the field of calculation, design and analytical activities;*
- *in the field of organizational and managerial activities;*
- *in the field of production and technological activities;*
- *in the field of project activities;*

- *in the field of innovation*
- *in the field of program and management activities.*

3) The objects of professional activity are mining enterprises of ferrous and non-ferrous metallurgy, fuel and energy complex, production of non-metallic mining raw materials, industry research and design institutes, laboratories of higher and secondary technical, primary vocational educational institutions.

According to the Approved minutes of the Meeting of committees on social partnership and regulation of social and labor relations for the mining, chemical, construction and wood industry, light industry and mechanical engineering on "16" August 2016 No. 1, master of engineering and technology with the right to work corresponds to the following levels of sectoral qualifications frameworks (ORC): 7 level – technical Director, development Director.

4 Passport of educational program

Volume and content of program

The term of study in the master's program is determined by the amount of academic credits mastered. Upon completion of the set amount of academic credits and achievement of the expected learning outcomes for obtaining a master's degree, the Master's degree program is considered to be fully mastered. In the profile master's program, there are 101 academic credits with a study period of 1.5 years.

Planning of the content of education, the method of organizing and conducting the educational process is carried out by the university and the scientific organization independently on the basis of credit technology of training.

The Master's program in the profile direction implements educational programs of postgraduate education for the training of managerial personnel with in-depth professional training.

The content of the Master's degree program consists of:

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

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

3) experimental research work, including the implementation of a master's project – - for a specialized master's degree;

4) final certification.

The contents of OP in "Mining engineering" based on the development of multilevel system of training, soundness and quality of education, continuity of education and science, unity of training, education, research and innovation aimed

at maximum satisfaction of inquiries of consumers should ensure:

-provision of high-quality professional education in the field of development of mineral deposits (MPI) confirmed the level of knowledge, skills and competencies based on established State educational standard of the criteria of evaluation in content and volume;

- training of professional and competitive specialists in the field of development of MPI and creation of new technologies of mining production and production management;

- ability to apply knowledge of mathematics, fundamental and technical sciences;

- use of methods of analysis and evaluation of experimental results;

The educational program of the specialty "Mining engineering" contains the full list of academic disciplines, grouped in cycles base (DB) and majors (PD) as mandatory components, and components for selection, indicating the complexity of each subject in the credits established by the State compulsory standards of higher and postgraduate education approved in accordance with Law of RK dated 04.07.2018, No. 171-VI SAM, see order of the Minister of education and science of the Republic of Kazakhstan from October 31, 2018 No. 604.

Objectives of the educational program:

- implementation of technical management of mining and blasting operations, as well as works to ensure the functioning of equipment and technical systems of mining production;

- develop, coordinate and approve regulatory documents regulating the procedure for performing mining, blasting operations, as well as works related to the primary processing of solid minerals, construction and operation of underground structures, ensure compliance with the requirements of technical documentation for the production of works, current norms, rules and standards;

- develop and implement measures to improve the environmental safety of mining production;

- be guided in practical engineering activities by the principles of integrated use of the geo-resource potential of the subsurface;

- develop and implement measures to improve and improve the technical level of mining production, ensure the competitiveness of the organization in modern economic conditions;

- develop plans for the elimination of accidents in the production of works on the extraction and primary processing of solid minerals, as well as in the construction and operation of underground facilities;

- organize your work and labor relations in the team on the basis of modern methods, management principles, advanced production experience, technical, financial, social and personal factors;

- monitor, analyze and evaluate the actions of subordinates, manage the team

of performers, including in emergency situations;

- provide training and certification of employees in the field of industrial safety;
- conduct a technical and economic analysis, comprehensively justify the operational decisions taken and implemented, find opportunities to improve production efficiency, assist in providing the company's divisions with the necessary technical data, regulatory documents, materials, equipment;
- to carry out work on improvement of production activity, development of projects and programs of development of the enterprise (divisions of the enterprise);
- analyze the processes of mining, mining and construction industries and complexes of equipment used as control objects;
- to plan and carry out theoretical, experimental and laboratory research, process the results obtained with the use of modern information technologies;
- carry out patent search, study scientific and technical information, domestic and foreign experience on the subject of research;
- develop models of processes, phenomena, evaluate the reliability of the constructed models using modern methods and means of information analysis;
- prepare reports on experimental research work independently or as part of creative teams;
- conduct certification tests (studies) of the quality of the mining company's products, equipment, materials and technological processes used;
- to develop measures for the quality control of products;
- use methods of forecasting and assessing the level of industrial safety at production facilities, justify and implement effective measures to reduce industrial injuries;
- carry out a technical and economic assessment of solid mineral deposits and underground construction facilities, the efficiency of the use of technological equipment;
- justify the parameters of the mining enterprise;
- perform calculations of technological processes, productivity of technical means of complex mechanization of works, throughput of transport systems of mining enterprises, draw up work organization schedules and calendar plans for production development;
- 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;

- 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.

5 Requirements for applicants

The previous level of education of applicants is higher professional education (bachelor's degree). The applicant must have a diploma of the established sample and confirm the level of knowledge of the English language with a certificate or diplomas of the established sample.

The procedure for admission of citizens to the master's program is established in accordance with the "Standard Rules for Admission to Training in Educational organizations that implement educational programs of postgraduate education".

The formation of a contingent of undergraduates is carried out by placing a state educational order for the training of scientific and pedagogical personnel, as well as paying for training at the expense of citizens ' own funds and other sources. The State provides citizens of the Republic of Kazakhstan with the right to receive free postgraduate education on a competitive basis in accordance with the state educational order, if they receive this level of education for the first time.

At the" entrance", the master's student must have all the prerequisites necessary for the development of the corresponding educational program of the master's degree. The list of necessary prerequisites is determined by the higher education institution independently.

In the absence of the necessary prerequisites, the master student is allowed to master them on a paid basis.

6 Requirements for completing studies and obtaining a diploma

Degree/qualifications awarded: The graduate of this educational program is awarded the academic degree "Master of Engineering and Technology" in the direction of the educational program 7M07215-Mining Engineering.

A graduate who has mastered master's 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 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 the team in the field of their professional activities, tolerantly perceiving social, ethnic, religious and cultural differences;
– readiness for communication in oral and written forms in a foreign language to solve problems of professional activity.

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

- *production activity:*

- ability to independently carry out production, field and laboratory and interpretation 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 activity:*

– the ability to independently draw up and submit projects of research and production works;
– readiness to design complex research and production works in solving professional problems;

- *organizational and managerial activity:*

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

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

When developing a master's program, all general cultural and general professional competencies, as well as professional competencies related to the 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.

7 Curriculum of the educational program

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K.I. SATPAYEV

SATBAYEV UNIVERSITY

Approved by:
Chairmen of the board-
Rector of the KazNRTU named after K.I.Satpayev"
_____ M.M. Begentayev
"06" 06 2021.

WORKING CURRICULUM

Educational program -7M07214 - "Mining Engineering"
enrolment for 2021-2022 academic year M116 - "Mining Engineering"
Full-time study
Term of study - 1,5 year
Academic degree: Master of Engineering and Technology

year of study	Code	Name of course	Component	Credits	Total hours	lecture/ laboratory/ practice	SIS (including STIS), in hours	Prerequisites
1 semester								
	LNG211	English language (professional)	BD IC	5	150	0/0/3	105	
	MNG725	Management	BD IC	3	90	1/0/1	60	
	HUM208	Psychology of management	BD IC	3	90	1/0/1	60	
	MIN238	Innovative methods of drilling and blasting operations	BD IC	5	150	2/0/1	105	
	MIN268	Digital technology in mining SMART Mine	PS IC	5	150	1/0/2	105	
1	MIN299	The Code on Subsurface Resources and legal regimes in subsurface use	PS IC	5	150	2/0/1	105	
		In total:		26				
		3 semester						
	AAP252	Industrial internship	PS IC	10				
2	AAP221	Experimental and research work of the undergraduate, including the performance of the master's thesis	MSSR	14				
	ECA206	Registration and protection of the master's thesis	FE	12				
	In total:			36				
2 semester								
	MIN273	Design of underground mines	PS IC	5	150	2/0/1	105	
	MIN211	Methodology of designing of underground construction						
	MIN253	Technology of construction of metropolitan	PS IC	5	150	2/0/1	105	
	MIN285	Modernization of the processes of horizontal and inclined mine workings						
	MIN700	Highly rhythmic safe production of mining operations in deep quarries	PS IC	5	150	2/0/1	105	
	MIN701	Intensification of reclamation of lands disturbed by open mining operations						
	MIN295	Technology of laying of the developed space	PS IC	5	150	2/0/1	105	
	MIN296	Rational technologies for development of placer deposits						
	MIN298	Resource-saving complex development of mineral resources	PS IC	5	150	2/0/1	105	
	MIN294	Methods of cowl mining in sections						
	AAP220	Experimental and research work of the undergraduate, including the performance of the master's thesis	MSSR	4				
	In total:			29				

Decision of the Academic Board of KazNRTU named after K.I.Satpayev, Protocol No. 3 of "26" 05 2021.

Decision of the Academic Board of the Institute of Geology, Oil and Mining, Protocol No. 5 of "24" 05 2021

Vice-rector for academic affairs — B.A. Zhauitbay

Director of the Institute Mining and Metallurgical — K.B. Ryskeldy

Head of the Department "Mining" — S.K.Mukhashayev

Chairman of the Specialty Council from employers — N.S. Bukiyakov

Number of credits for the whole period of study	
Cycles of disciplines	Credits
The cycle of general education	0
A cycle of basic disciplines (BD IC, BD OC)	16
A cycle of principal subjects (PS IC, PS OC)	45
All on the theoretical classes:	61
MSSR	18
Registration and defense of the master's thesis (RaDMT)	12
In total	91

Modular educational program

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K. I. SATPAYEV

SATBAYEV UNIVERSITY

APPROVED
Chairman of the Board-
Rector of KazNRTU named after K. Satpaeva
_____ Begentaev M.M.
«__» _____ 20__ y.

MODULAR EDUCATIONAL PROGRAM for admission for the 2021-22 academic year
Educational program 7M07214 - "Mining Engineering "
Group of educational programs M116 - "Mining Engineering"
Form of study: daytime Study duration: 1,5 years Academic degree: master of engineering and technology

Year of study	Discipline Code	Name of disciplines	semester	Cycle	Credits	Total hours	classroom volume lx / lab / pr	(including ISWT) in hours	form of control	Competencies
		Basic training module								
		University component								
1	LNG210	Foreign language (professional)	1	BD IC	5	150	0/0/3	105	E	no
1	MNG274	Management	1	BD IC	3	90	1/0/1	60	E	no
1	HUM204	Psychology of management	1	BD IC	3	90	1/0/1	60	E	no
1	MIN258	Innovative methods of drilling and blasting operations	1	BD IC	5	150	2/0/1	105	E	MIN101
		Profile training module								
		Component of choice								
1	MIN268	Digital technology in mining SMART Mine	1	PD OC	5	150	1/0/2	105	E	MIN101
1	MIN299	The Code on Subsurface Resources and legal regimes in subsurface use	1	PD OC	5	150	2/0/1	105	E	MIN101
1	MIN273	Design of underground mines	2	PD OC	5	150	2/0/1	105	E	MIN101
1	MIN211	Methodology of designing of underground construction								MIN448
1	MIN253	Technology of construction of metropolitan	2	PD OC	5	150	2/0/1	105	E	MIN448
1	MIN285	Modernization of the processes of horizontal and inclined mine workings								MIN448
1	MIN700	Highly rhythmic safe production of mining operations in deep quarries	2	PD OC	5	150	2/0/1	105	E	MIN101
1	MIN701	Intensification of reclamation of lands disturbed by open mining operations								MIN101
1	MIN295	Technology of laying-of the develped space	2	PD OC	5	150	2/0/1	105	E	MIN101
1	MIN296	Rational technologies for development of placer deposits								MIN101
1	MIN298	Resource-saving complex development of mineral resources	2	PD OC	5	150	2/0/1	105	E	MIN101
1	MIN294	Methods of coal mining in sections								MIN101
		Practice-oriented module								
	AAP252	Production practice	3	BD IC	10				Report	
		Science-research module								
	AAP220	Research work of a master's student, including an internship and a master's thesis	2	NIRM	4				Report	
	AAP221	Research work of a master's student, including an internship and a master's thesis	3	NIRM	14				Report	
		Final certification module								
		Required component								
	ECA206	Registration and defense of a master's thesis	3	IA	12				Defense of dissertations	

The number of credits for the entire period of study	
Discipline cycles	**Credits**
Cycle of basic disciplines (BD IC, BD OC)	16
Cycle of majors (PD OC, PS OC)	45
Total theoretical training:	***61***
MSSR	18
Registration and defense of a master's thesis	12
TOTAL:	**91**

The decision of the Academic Council of KazNRTU named after K. Satpaeva. Protocol №___of "____" _____ 20__ y.

Decision of the Academic Council of the Institute_____. Protocol № ___ of "____" _____ 20___ y.

Vice-Rector for Academic Affairs **B.A. Zhautikov**

Director of the Institute **K.B.Rysbekov**

Head of the Department **S.K.Moldabaev**

Representative of the Specialty Council from employers **N.S.Buktukov**

8 Descriptors of the level and scope of knowledge, skills, skills and competencies

The requirements for the level of training of a master's student are determined on the basis of the Dublin descriptors of the second level of higher education (master's degree) and reflect the acquired competencies expressed in the achieved learning outcomes.

The results of training are formulated both at the level of the entire educational program of the master's degree, and at the level of individual modules or academic discipline.

Descriptors reflect learning outcomes that characterize the learner's abilities:

A-knowledge and understanding:

A1-The ability to logically represent the acquired knowledge and understanding of system relationships in the production processes of mining, in the sinking of main and auxiliary mine workings.

A2-Knowledge of approaches and methods of critical analysis, the ability to use them practically in solving problems of mining production;

A3-Know the methods of collecting and analyzing all information about the mountain range and the existing network of mine workings for making design and planning decisions (drawing up a mining plan, developing measures to prevent deformations of the rock mass, etc.), the theory and practice of continuous design of mining enterprises, methods for justifying their main parameters and production capacity.

B-application of knowledge and understanding:

B1-Independent development and promotion of various options for solving mining and technological problems using the obtained theoretical and practical knowledge;

B2-Put forward hypotheses for acquiring new knowledge necessary for daily professional activities in the field of mining and continuing self-education;

B3 – On the basis of basic knowledge to be able to adequately navigate in various situations of mining production.

C-formation of judgments:

C1 - on the basis of knowledge of the relationship of all production processes for forecasting and planning the activities of a mining enterprise;

C2 – be able to work in a team, correctly defend your point of view, and offer new ways to solve mining problems;

C3-skills of daily acquisition of new knowledge necessary for high-quality performance of their functions of professional activity.

D – personal abilities:

D1-compliance with the norms of business ethics, possession of ethical and moral standards of behavior in their activities;

D2-ability to find a compromise, correlate your opinion with the opinion of the team;

D3-know social and ethical values based on public opinion, traditions, customs, social norms and be able to navigate them in their professional activities.

9 Competencies at the end of studies

9.1 Requirements for the key competencies of *graduates of the profile master's degree*, must:

1) understand:

- on current trends in the development of scientific knowledge;
- on current methodological and philosophical problems of natural (social, humanitarian, economic) sciences;
- on the contradictions and socio-economic consequences of globalization processes;
- on the current state of the economic, political, legal, cultural and technological environment of the global business partnership;
- on the organization of strategic enterprise management, innovation management, leadership theories;
- about the main financial and economic problems of the functioning of enterprises.

2) know:

- methodology of scientific knowledge;
- the main driving forces of changes in the structure of the economy;
- features and rules of investment cooperation;

– at least one foreign language at a professional level that allows you to conduct scientific research and practical activities.

3) able to do:

- apply scientific methods of knowledge in professional activities;
- critically analyze existing concepts, theories and approaches to the study of processes and phenomena;
- integrate knowledge gained in different disciplines, use it to solve analytical and managerial tasks in new unfamiliar conditions;
- conduct a microeconomic analysis of the economic activity of the enterprise and use its results in the management of the enterprise;
- apply in practice new approaches to the organization of marketing and management;
- make decisions in complex and non-standard situations in the field of organization and management of economic activities of the enterprise (firm);
- to apply in practice the norms of the legislation of the Republic of Kazakhstan in the field of regulation of economic relations;

- think creatively and be creative in solving new problems and situations;
- conduct information-analytical and information-bibliographic work with the involvement of modern information technologies;
- summarize the results of experimental research and analytical work in the form of a master's thesis, article, report, analytical note, etc.

4) to have skills:

- solutions to standard scientific and professional tasks;
- scientific analysis and solution of practical problems in the organization and management of economic activities of organizations and enterprises;
- research problems in the field of management and marketing and use the results to improve the methods of enterprise management;
- professional communication and intercultural communication;
- oratory, correct and logical design of their thoughts in oral and written form;
- expanding and deepening the knowledge necessary for daily professional activities and continuing education in the doctoral program;
- use of information and computer technologies in the field of professional activity.

5) be competent:

- in the field of research methodology in the specialty;
- in the field of modern problems of the world economy and the participation of national economies in world economic processes;
- in the organization and management of the company's activities;
- in the implementation of industrial relations with various organizations, including public service bodies;
- in ways to ensure constant updating of knowledge, expansion of professional skills and abilities.

B - Basic knowledge, skills and abilities:

B1- knowledge of the main methods, methods of MPI development, the main technological processes of mining production, opening schemes and systems of PI development, as well as complex mechanization of mining operations;

B2 - the ability to solve standard problems of mining production using innovative technologies (SMART mine, quarry, etc.).

P-Professional competencies, including in accordance with the requirements of industry professional standards, providing deep theoretical knowledge and practical skills in the field of solid mineral development.

P1 – A wide range of theoretical and practical knowledge in the professional field, technology and complex mechanization of mining and blasting operations, applied and promising methods of full and comprehensive development of the subsoil, taking into account industrial and environmental safety.

P2-Master the issues of basic technological processes at mining enterprises of ferrous and non-ferrous metallurgy, heat and power complex, non-metallic

building materials, nuclear industry, metro construction, depending on the chosen field of training.

P3-Have the skills to analyze mining and geological conditions in the extraction of solid minerals, as well as in the construction and operation of underground facilities;

P4-Master the basic principles of technologies for the extraction and primary processing of solid minerals, construction and operation of underground facilities;

P5-Readiness to carry out technical management of mining and blasting operations in the extraction of solid minerals, construction and operation of underground facilities, directly manage processes at production facilities, including in emergency situations;

P6-Readiness to demonstrate skills in developing action plans to reduce the anthropogenic impact of production on the environment in the extraction and primary processing of solid minerals, as well as in the construction and operation of underground facilities;

P7-Use of regulatory documents on safety and industrial sanitation in the design, construction and operation of enterprises for the extraction and primary processing of solid minerals and underground facilities;

P8-Knowledge of methods of geological and industrial assessment of mineral deposits, mining branches;

P9-Possession of the legislative framework for subsurface use and ensuring environmental and industrial safety of operations in the extraction, primary processing of minerals, construction and operation of underground structures;

P10 – the Ability to develop and bring to the performers outfits and job mining, construction and blasting, to control the quality of works and to ensure the correctness of their performers, schedules of work and future plans, instructions, estimates, applications for materials and equipment to complete the required reporting documents in accordance with established forms;

P11-Ability to perform marketing research, conduct economic cost analysis for the implementation of technological processes and production in general;

P12 – Be able to study and use scientific and technical information in the field of mining, primary processing of solid minerals, construction and operation of underground facilities;

P13-Readiness to perform experimental and laboratory studies, interpret the results obtained, prepare and protect reports;

P14-Readiness to use technical means of pilot testing of equipment and technologies in the extraction, primary processing of solid minerals, construction and operation of underground facilities;

P15-Proficiency in the organization of experimental research works;

P16-Readiness to develop innovative design solutions for the extraction, primary processing of solid minerals, construction and operation of underground

facilities;

P17 – the Ability to develop the necessary technical and regulatory documentation as part of the creative teams and independently monitor compliance with the projects standards, specifications and documents of industrial safety, to develop, agree and approve in the prescribed manner of the technical, methodological and other documents governing the quality and safety performance of mining, construction and blasting;

P18-Readiness to demonstrate skills in developing systems to ensure environmental and industrial safety in the production of works on the extraction and processing of solid minerals, construction and operation of underground facilities;

P19-Readiness to work with software products of general and special purpose for modeling of deposits of solid minerals, technologies of extraction and primary processing of solid minerals, during construction and operation of underground facilities, assessment of economic efficiency of mining and mining and construction works, production, technological, organizational and financial risks in market conditions.

P20 – Skills of conducting experimental research, performing laboratory and experimental studies with subsequent processing of results using modern computer technologies, improving existing and developing new research methods and techniques, technical and technological solutions and hardware for their implementation, choosing technical means for conducting experimental research.

O-Universal, social and ethical competencies:

O1 - Ability to abstract thinking, analysis, synthesis;

O2-The ability to use the foundations of philosophical knowledge to form a worldview position;

O3-The ability to analyze the main stages and patterns of historical development of society for the formation of a civil position;

O4-The ability to use the basics of economic knowledge in various spheres of life;

O5-Ability to use the basics of legal knowledge in various spheres of life;

O6-The ability to use methods and means of physical culture to ensure full-fledged social and professional activities;

O7-The ability to use first aid techniques, methods of protection in emergency situations.

C-Special and managerial competencies:

C1-The ability to solve the problems of professional activity on the basis of information and bibliographic culture with the use of information and communication technologies and taking into account the basic requirements of information security;

C2-Readiness for communication in oral and written forms in the state,

Russian and foreign languages to solve the problems of professional activity;

C3-Readiness to use scientific laws and methods in the geological and industrial assessment of solid mineral deposits and mining branches;

C4-Readiness to use scientific laws and methods in assessing the state of the environment in the field of operation of production facilities for the extraction and processing of solid minerals, as well as in the construction and operation of underground facilities;

C5-The ability to select and (or) develop the provision of integrated technological systems for the extraction and processing of solid minerals, as well as enterprises for the construction and operation of underground facilities with technical means with a high level of control automation;

C6-Proficiency in methods of analysis, knowledge of patterns of behavior and management of rock properties and the state of the massif in the processes of extraction and processing of solid minerals, as well as in the construction and operation of underground structures.

9.2 Requirements for experimental research work of a master's student in a specialized master's program:

1) corresponds to the profile of the master's degree program, according to which the master's project is carried out and defended;

2) it is based on modern achievements of science, technology and production and contains specific practical recommendations, independent solutions to management tasks;

3) performed with the use of advanced information technologies;

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

9.3 Requirements for the organization of practices:

The educational program of the profile master's degree includes industrial practice in the PD cycle.

Industrial practice in the PD cycle is carried out in order to consolidate the theoretical knowledge obtained in the course of training, acquire practical skills, competencies and professional experience in the master's degree program being taught, as well as master's best practices.

10 Supplement to the diploma according to the standard ECTS

The application is developed according to the standards of the European Commission, the Council of Europe and UNESCO/SEPES. This document serves only for academic recognition and is not an official confirmation of the document of education. It is not valid without a higher education diploma. The purpose of

filling out the European Application is to provide sufficient data on the holder of the diploma, the qualification obtained, the level of this qualification, the content of the training program, the results, the functional purpose of the qualification, as well as information about the national education system. The application model that will be used for the transfer of assessments uses the European Credit Transfer or Transfer System (ECTS).

The European Diploma Supplement provides an opportunity to continue education at foreign universities, as well as to confirm national higher education for foreign employers. When traveling abroad for professional recognition, additional legalization of the diploma of education will be required. The European Diploma Supplement is completed in English upon individual request and is issued free of charge.

11 Brief description of the disciplines

Foreign language (professional)
CODE-LNG211
CREDIT – 5 (0/0/3)
PREREQUISITES-Academic English, Business English, IELTS 5.0-5.5

PURPOSE AND OBJECTIVES OF THE COURSE

The aim of the course is to develop undergraduates ' knowledge of the English language for their current academic research and improve their performance in the field of project management.

BRIEF DESCRIPTION OF THE COURSE

The course is aimed at developing vocabulary and grammar for effective communication in the field of project management and improving reading, writing, listening and speaking skills at the Intermediate level. It is expected that undergraduates will acquire and expand their vocabulary of Business English and learn grammatical structures that are often used in the context of management. The course consists of 6 modules. The 3rd module of the course is completed with an intermediate test, and the 6th module is followed by a test at the end of the course. The course ends with a final exam. Undergraduates also need to study independently (MIS). MIS - independent work of undergraduates under the guidance of a teacher.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

Upon successful completion of the course, it is expected that undergraduates will be able to recognize the main idea and main message, as well as specific details when listening to monologues, dialogues and group discussions in the context of business and management; understand written and oral speech in

English on topics related to management; write management texts (reports, letters, emails, meeting minutes), following a generally accepted structure with a higher degree of grammatical accuracy and using business words and phrases, talk about various business situations, using the appropriate business vocabulary and grammatical structures - in pair and group discussions, meetings and negotiations.

Management
CODE-MNG725
CREDIT – 3 (3/0/1)
PREREQUISITE – No

THE PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the discipline "Management" is to master the methodology of project management in various fields of activity, to foster a culture adequate to modern project management and information technologies, to create conditions for the introduction of new information technologies in the field of project implementation. The course is based on international recommendations for project management (Project Management Body of Knowledge).

BRIEF DESCRIPTION OF THE COURSE

The content of the discipline is aimed at studying modern concepts, methods, and tools of project management in order to apply them in the further practical activities of a specialist to solve problems of project planning and execution.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

Be able to:

- prepare documents of the project initialization stage, such as a feasibility study, project charter, etc.
- develop and analyze documents related to the planning of project activities, apply various methods of decision support;
- promptly monitor the execution of works and track deadlines;
- to select personnel, to resolve differences between team members.;
- manage the risks that arise during the implementation of projects. Knowledge gained during the course of the discipline:
- Modern standards in the field of project management and their characteristics;
- PMI approach to project management; - Planning of investment activities;
- Accounting for project risks;
- Methods for optimizing the use of available resources;
- Ways to resolve conflict situations;
- Analysis of actual indicators for timely adjustment of the progress of work.

Management Psychology
CODE-HUM 208
CREDIT – 3 (1/0/1)
PREREQUISITES: None

THE PURPOSE AND OBJECTIVES OF THE COURSE are to teach undergraduates the basics of psychology of higher education, to expand their professional capabilities in terms of applying psychological knowledge in the field of pedagogical activity.

BRIEF DESCRIPTION OF THE COURSE

Psychological education at the university. Psychological structure of the learning process, psychology of cognitive activity, psychological methods and means of improving the efficiency and quality of teaching in modern conditions; psychology of the individual and the student group, the education and formation of professional consciousness, psychological testing in the higher school, psychological features of pedagogical activity of the teacher of high school student as a subject of educational activity, psychological and pedagogical communication; psychology of pedagogical influence, the main psychological problems in teaching.

KNOWLEDGE and SKILLS UPON completion of the COURSE At the end of the course the student should master the basic knowledge and skills about the social-psychological nature of pedagogical activity, the properties of mental and cognitive processes involved in cognitive activities, the content and the specifics of the psycho - pedagogical impact of the individual characteristics of the subject to the impact of skills, to be able to use psihologicheskie the necessary resources for preparing and conducting classes (lectures, seminars, classes and exams); be able to apply adequate psychodiagnostic methods of studying the personality of the student and the student group; manage the learning process, on various aspects of communication in the field of professional activity, professional reflection, possession of the main methods of psychological influence.

Innovative methods of drilling and blasting operations
CODE - MIN 258
CREDIT – 5 (2/0/1)
PREREQUISITE – MIN442 Destruction of rocks by explosion

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course: training highly qualified specialists in the field of mining and metallurgical production.

BRIEF DESCRIPTION OF THE COURSE

Modern drilling technology. The range of industrial explosives used in Kazakhstan and abroad. Research of factors affecting the quality of explosives

(industrial AND manufactured at mining enterprises). Modern methods of initiating industrial EXPLOSIVES. Synergetics of mining and technological processes of drilling and blasting operations. Resource-saving technologies for drilling and blasting operations. Environmental aspects of drilling and blasting operations.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE

The master's student should know: modern technologies of drilling operations, the range of industrial explosives, innovative methods of drilling and blasting operations in the extraction of minerals.

The master's student must be able to: choose rational methods of drilling and blasting operations in specific mining and geological conditions, apply optimization of development parameters and completeness of extraction of minerals from the subsurface, make technical documentation for drilling and blasting operations.

Digital technologies in mining production SMART Mine

CODE – MIN 268

CREDIT– 5 (1/0/2)

PRECONDITION –

PURPOSE AND OBJECTIVES OF THE COURSE

To introduce and train students in the main digital technologies and directions in the field of Smart mining, digital technologies in data processing and analysis will be studied, starting from collecting information from various devices and ending with the visualization of results using the technology of the situation center.

The goal of the course is to teach students data processing methods using the SQL programming language, python, data storage in a database, basic data processing algorithms, existing solutions for MES, LIMS, inventory management and document management.

BRIEF DESCRIPTION OF THE COURSE

Minimizing uncertainty in the production process, reducing costs and adapting to changes are some of the factors that encourage mining companies to look at digital innovations that will significantly improve the productivity (production of finished products) of the enterprise.

Now, when the mining industry is looking for productivity improvements, it is necessary to improve competencies, technical knowledge and introduce innovations to the industry, better understand the various variations of the business process, accurately identify them and be able to respond to these variations with efficiency. The blood-pumping system for digital technology is data or data flow, the ability to stream data and optimize processes to transfer data to the right hands at the right time is crucial. The cycle time for this process will tend to be

transactional levels, as the value is implemented to increase control and optimize the process.

The essence of digital innovation is to determine how to transform current business processes and confidently use these new digital tools. Two main things need to happen: one is to figure out how to consolidate data from all these new devices, and the other is how to make them fit into the business.

The ability to obtain reliable data without the use of manual processes or specific personnel is essential for using the mine's smart. Therefore, the transition to the ability to process streaming data and deep process optimization to support getting that data into the right hands or digital process at the right time should be considered critical.

The advantage that businesses will get from the introduction of digital technologies is: conversion to a stream of accurate (excluding manual input), consistent data and deep optimization of processes to get this data into the right hands faster. Cross-functional, total system thinking will become the leader of digital innovation in mining.

In this course, students will learn a whole range of digital technologies in mining, which make up the concept of Samrt mine. Main technologies: data Flow, data processing, storage and visualization, SQL programming language, python, data collection using MES systems, LIMS concept, collection and counting of finished products using software products, situation center technology.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

After completing the course, the student will acquire knowledge on the possibilities of using digital technologies in mining, data processing using SQL and python, data visualization, and know the risks of transforming business processes into new technologies.

The master's student should know: current trends in the development of computer science and technology, computer technology, the basics of creating information systems and the use of new information processing technologies, in-depth knowledge in Geology, mining.

The master's student must be able to: collect, process and analyze data in mining, use data management tools in software products from the field of mining, engineering and technology of mining and processing of minerals, make reports from the field of mining.

Subsoil Code and rights regimes in subsoil use

CODE – MIN 299

CREDIT - 5 (2/0/1)

PRECONDITION –

PURPOSE AND OBJECTIVES OF THE COURSE

The goal is to prepare the graduate to use the rights and obligations in relations on subsurface use

The purpose of the course is to study the legal regulation of relations in the field of subsoil use

BRIEF DESCRIPTION OF THE COURSE

General provisions on subsurface use rights, types of subsurface use operations, subsurface use rights regimes, transfer of subsurface use rights, state control over the turnover of subsurface use rights, elimination of consequences of subsurface use, features of granting and termination of subsurface use rights for uranium.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

As a result of mastering the course, undergraduates gain knowledge about the legal regulation of relations in the field of subsoil use, the ability and skills to use the articles Of the code on subsoil use.

Design of underground mines

CODE – MIN 273

CREDIT – 5 (2/0/1)

PRECONDITION –

PURPOSE AND OBJECTIVES OF THE COURSE:

Study of modern methods of designing mineral deposits in the underground mining method, the main documents regulating the design and regulatory documents, the principles of organization, types and procedure for performing design work, software for the design of underground mines.

BRIEF DESCRIPTION OF THE COURSE:

General information about design, the composition of project documents, design stages, new programs, software for design, working with database files, creating and analyzing: points, strings, frames, digital surface models and block models, creating underground workings.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

As a result of studying this discipline, undergraduates should know and be able to:

- main types of projects and project documents;
- open and analyze graphic design documents created using AutoCad, DataMine, and Micromine;
- the main parameters and indicators of the project;
- select and perform calculations based on the method of opening and development of mineral deposits;
- select and perform calculations based on the development system;
- use software products for design.

Methodology for the construction of underground structures
CODE – MIN 211
CREDIT – 5 (2/0/1)
PRECONDITION –

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline is to master the methodology of designing the construction of underground structures, practical skills in choosing optimal solutions for the organization of construction, acquiring the skills of independent creative solutions to the problems of drafting project documentation and management of mining operations.

Objectives - information about regulatory documentation, content and procedure for development of technical documentation for construction design of underground structures; the basic principles of design of building surface and underground facilities; to teach the student to make the best decisions for the organization of construction of underground structures and calculation of its design.

BRIEF DESCRIPTION OF THE COURSE

Organization of design of construction of underground structures. Scientific research in the construction of underground structures. Engineering design methods. Design stages of underground construction. Technological calculation. Methods for solving project problems. Technical and economic part of the project for the construction of underground structures.

KNOWLEDGE SKILLS AT THE END OF THE COURSE

The process of studying the course is aimed at the formation of the following competencies:

General cultural:

- Using the basic laws of natural science disciplines in professional activities, using methods of mathematical analysis and modeling, theoretical and scientific research;

professional:

- ability to develop preliminary designs of buildings and underground structures, to manage the development of technical and operational projects of these structures using computer-aided design tools;
- ability to organize the work of a team of performers, plan the execution of works on the design and construction of underground structures, buildings and their underground structures, make independent technical decisions;
- ability to conduct geotechnical surveys and scientific research for the design of buildings and underground structures, drawing up their plans;
- ability to organize the process of construction of underground structures and structures using new technologies and modern equipment to make independent

technical decisions;

- ability to conduct a feasibility study of the construction of underground structures and structures.

in the field of survey and design activities:

- knowledge of mathematical modeling methods based on licensed design and research automation packages, methods of setting up and conducting experiments using specified methods;

- ability to make reports on completed works, participate in the implementation of research and practical development results.

As a result of studying the course

A MASTER'S STUDENT SHOULD KNOW:

- technology of construction of underground structures, methods of construction of mine workings; - the main characteristics of modern mining machines and equipment, scientific and engineering bases for selecting technologies for mining and construction work and labor protection.

A MASTER'S STUDENT MUST BE ABLE TO:

- be able to prepare and carry out the construction of underground structures using effective technology and equipment; make technical decisions to ensure the safety of mining and construction works.

Metro Underground Construction Technology

CODE – MIN 253

CREDIT – 5 (2/0/1)

PRECONDITION –

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose and objectives of the course: to impart students knowledge and skills necessary for independent creative solutions to problems related to the implementation of technological processes of construction of underground metro facilities; to teach creatively apply advanced techniques and technology, seeking to raise the pace of construction and productivity, improve work quality, cost reduction, and rational use of labor resources.

BRIEF DESCRIPTION OF THE COURSE

Selection and calculation of structures underground facilities underground mount underground structures, the preparation period construction, building construction and installation of barrels underground, technology and organization of construction approach and inclined workings, technology and organization of construction of tunnels using tunneling shields of the technological scheme of construction of subway stations, the construction of the three-vault subway stations, the construction of the subway station with advanced supports and elements of NEPA, the construction of metro facilities in an open way, technology

for construction of underpasses using push-through installations and micro-panels, technology for construction of collector tunnels, technology for construction of transport interchanges, technology for construction of underground garages and other large-section workings.

KNOWLEDGE SKILLS AT THE END OF THE COURSE

After completing the course, the student will master the knowledge of choosing an effective technology for the construction of underground metro facilities, and independently draw up projects for the construction of various metro facilities.

The master's STUDENT SHOULD KNOW: the purpose and location of workings in the space and plan of the city, technological schemes of workings in various mining and geological conditions; types of temporary supports and linings and the technology of their construction; advanced mining and construction equipment and the principle of its operation; the main and auxiliary processes in the construction of underground structures.

The master's STUDENT MUST be ABLE to: independently and reasonably choose and calculate the necessary lining of an underground structure, if necessary, and temporary support, design the shape and size of the cross-section of the underground complex workings, choose the technique and technology for the construction of underground metro facilities, search for and make engineering, economic and organizational decisions and justify their adoption.

Modernization of the processes of horizontal and inclined mine workings

CODE – MIN 285

CREDIT – 5 (2/0/1)

PRECONDITION

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose and task of studying the discipline "Modernization of processes of horizontal and inclined mining" is to study the modern technology of construction of horizontal and inclined mining, the acquisition of knowledge about the main processes of mining, means of mechanization, conditions for their application, methods of mining.

BRIEF DESCRIPTION OF THE COURSE

General issues of construction of horizontal mine workings. Methods of conducting workings. Shapes and sizes of the cross-section of workings. Construction of horizontal workings in strong homogeneous rocks by drilling and blasting. Drilling and blasting operations. Ventilation of the workings. Loading the rock. Bottom-hole transport. Auxiliary work. Fixing workings. Complexes of tunneling equipment. Construction of horizontal workings with the use of harvesters. Conditions of use of the harvesters. Construction of workings using

selective harvesters. The construction of the mine workings with the use of combines the drilling action. The construction of the inclined workings. Technology of construction of inclined workings from top to bottom. Technology of construction of inclined workings from the bottom up. Sinking of the rebels.

KNOWLEDGE SKILLS AT THE END OF THE COURSE

The master's student should know: - the main physical and mechanical properties of rocks, and their impact on the stability of the rock mass; the nature and scope of various methods of conducting; technology for construction of horizontal and inclined mine workings with the use of BVR; methods of sinking rising; classification of combines for underground mining of mineral deposits for functional purposes; factors affecting the parameters of ventilation; organization of work during mining.

The master's student must be able to: - determine the rational dimensions of the cross-section of the workings; choose a set of tunneling equipment for horizontal and inclined mining; - perform technological calculations; - determine the design parameters of drilling and blasting operations; - make technical decisions to ensure the safety of mining operations; - draw up projects for mining operations.

Highly safe mining operations in deep quarries

CODE – MIN 700

CREDIT - 5 (2/0/1)

PRECONDITION

PURPOSE AND OBJECTIVES OF THE COURSE

Training of specialists for efficient operation of deep quarries in the development of working areas along steep sides without the formation of temporarily non-working sides within the development stage.

Task of discipline is to study of technology of mining steeply inclined layers with simultaneous testing of several ledges from the top down transverse panels leaving on a working Board instead of working platforms only transport and safety berms and methodology for its implementation within the development stage and the period of transition from one development stage to another stage.

BRIEF DESCRIPTION OF THE COURSE

Analysis of technology for step-by-step development of steep-falling deposits. Existing methods of deconservation of temporarily non-working boards in deep quarries. Technology and methodology for implementing the development of work zones on steep sides of elongated quarry fields. Choosing a way to switch to the technology for developing work zones on the steep sides of elongated quarry fields. Technology and methodology for implementing the development of work zones on the steep sides of round-shaped quarry fields. Choosing a way to switch

to the technology for developing work zones on the steep sides of round-shaped quarry fields. Establishing the optimal schedule of mining operations when switching to the technology for developing working zones on steep sides on long and rounded quarry fields. Testing of technology for developing work zones on the steep sides of coal and iron ore quarries. Planning high-rhythm mining operations at the world's leading quarries. Methodological provisions for the transition to high-rhythm safe intensive mining operations on the steep sides of deep pits.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

After completing the course, the student will master the knowledge of high-rhythm safe intensive mining operations on the steep sides of deep pits.

The master's student should know: the technology and methodology for implementing the development of work zones on the steep sides of long and rounded quarry fields, the features of planning mining operations in stages of 2-3 years as in the advanced quarries of the world.

A master's student should be able to: find optimal solutions to minimize the cost of eliminating the backlog of overburden operations in operated deep pits; justify an effective way to switch to the technology of developing work zones along steep sides in long and rounded quarry fields; establish the minimum sufficient width of the steep-slope layer to meet the demand for commercial products during certain periods of field development and the timing of the start of mining the next steep-slope layer to stabilize the extraction of minerals with optimal current volumes of overburden excavation; justify the feasibility of high-rhythm mining operations to avoid monthly regulation of current mineral reserves.

Intensification of reclamation of lands disturbed by open-pit mining

CODE – MIN 701

CREDIT - 5 (2/0/1)

PRECONDITION –

PURPOSE AND OBJECTIVES OF THE COURSE

The goal is to form knowledge about the directions and conduct of reclamation of land disturbed by mining operations, to form knowledge about the General principles of restoring the fertile soil layer and measures to protect the environment, which allow the use of natural resources and limit the anthropogenic load on the environment.

The objective of the discipline is to study the legal framework for solving the issues of intensification of reclamation of land disturbed by mining operations, the direction and technology of reclamation, and the formation of knowledge about the features of soil formation processes in technogenic landscapes.

BRIEF DESCRIPTION OF THE COURSE

The state of land resources of the country and the parameters of the areas to

be disturbed in surface mining of mineral deposits, disturbance of the land at open depending on the shapes of dumps, the appointment of topsoil, the technology of its removal, storage, laying and mining planning in the tailings, evaluation of the parameters of external piles subject to reclamation, selective formation of the external dumps, use of waste pits for the storage of overburden, reclamation of external dumps constructed and unsuitable land, fundamentals of economic assessment and rational use of land in open development.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

After completing the course the student will possess knowledge on the sequence and complete the production task of the reclamation of disturbed mining lands, develop a set of measures to restore and preserve natural sites.

The master's student should know: the concept of reclamation of disturbed land, terms and definitions, types of disturbed land, methods and means of reducing environmental pollution; laws of functioning of natural ecosystems and their anthropogenic variants, directions and procedure of restoration work, the legal framework for reclamation of disturbed land; directions, technologies and techniques of reclamation.

The student should be able to: adequately use the methods in geospatial and design of the rehabilitation works, to recognize, to know, to determine the landscape organisation man-made landscape; conduct quantitative and qualitative assessment of the ecological status of disturbed landscape; to determine the composition of vegetation and to establish a syngenetic change of phytocenoses and phases of soil formation on industrial dumps; justify (explain, compare, draw conclusions) features use the direction and technology of remediation with regard to their environmental safety; explain the best option for a project to reclaim disturbed land.

Technology of laying-of the develped space

CODE – MIN 295

CREDIT - 5 (2/0/1)

PRECONDITION

PURPOSE AND OBJECTIVES OF THE COURSE

Familiarize students with the discipline by studying the application, preparation and transportation of the filling mixture for the developed space.

When studying the discipline, undergraduates will receive knowledge that will contribute to a better assimilation of knowledge in the future with a detailed study of mining processes and mining pressure management.

BRIEF DESCRIPTION OF THE COURSE

Areas of application, types, methods of transportation of the laying material. Modern additives to improve the characteristics of the filling mixture. Hydraulic,

pneumatic, hardening, gravity and mechanical filling mixes.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

As a result of mastering the course, undergraduates must master a set of processes for filling the underground worked - out space of mines with laying materials.

Rational technologies for development of placer deposits

CODE - MIN296

CREDIT – 5 (2/0/1)

PREREQUISITES

PURPOSE AND OBJECTIVES OF THE COURSE

As part of the course, undergraduates should master general information about placers, brief information about the search, exploration, calculation and approval of placer reserves, general information about the development of placers, a set of technologies for mining and operational (preliminary, preparatory, mining) works in the development of placers by open (bulldozer-scraper, excavator, hydraulic), underwater (multi-pack dredges) and underground methods will be considered.

BRIEF DESCRIPTION OF THE COURSE

General information about placers; Brief information about prospecting, exploration, calculation and approval of reserves; General information about placer development; Open placer development; Bulldozer-scraped method of development; Excavator method of development; Hydraulic method of development; Placer development by underground method; Development of watered placers by drainage method.

KNOWLEDGE SKILLS, SKILLS AT THE END OF THE COURSE

After completing the course, a master's student must demonstrate the ability to analyze and synthesize the processes of opening placer deposits. To obtain basic information on terminology, natural-climatic and mining conditions of the areas of distribution of placer gold deposits.

A MASTER'S STUDENT SHOULD BE ABLE TO: distinguish between rocks and minerals composing placers; types of placers and their features, the structure of placers, etc. On the basis of mining and geological information about the placer deposit, choose methods for conducting mining preparatory and stripping operations, as well as sand development.

THE MASTER'S STUDENT SHOULD KNOW: the classification of placers according to technological characteristics, methods of prospecting and exploration of placers, sand development, including the technology of the hydraulic method for the development of placer deposits and the basis of hydraulic enrichment of placers, environmental protection and reproduction of natural resources in the

development of placers.

Resource Saving Integrated Mineral Resources

CODE – MIN 298

CREDIT - 5 (2/0/1)

PRECONDITION - Mining technology, systems for developing mineral deposits

PURPOSE AND OBJECTIVES OF THE COURSE

The goal is to teach the future specialist to find solutions in difficult situations at mining enterprises, when designing with the use of new resource-saving technologies for the development of mineral deposits.

Course objective:

- study and analyze current problems in the development of mineral deposits;
- to master new technological solutions in the development of mineral deposits in order to ensure resource conservation, completeness of extraction, safety and environmental friendliness.

BRIEF DESCRIPTION OF THE COURSE

- current state and problems in field development,
- mineral resources in the world and in Kazakhstan, resource-saving
- methods of extraction of minerals, methods of re-development of mineral deposits and processing of waste from mining and metallurgical production.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Ability to plan issues of economic, technical and technological complex use of ore deposits, design and practical solutions.

As a result of mastering the course, undergraduates should know: the current state and problems in the development of mineral deposits; new resource-saving technologies for the development of mineral deposits;complex technologies for obtaining various products in the development of minerals; technology of underground gasification and hydro production in the development of coal deposits.

Mining methods on coal mines

CODE - MIN 294

CREDITS – 5 (2/0/1)

PREREQUISITE Methodology of continuous design of open pit mines

GOALS AND PURPOSES OF THE COURSE

Study of progressive methods of coal mining on the example of advanced enterprises of the fuel and energy complex of Kazakhstan.

COURSE DESCRIPTION

Open pit mining of inclined and steep coal seams. Continuous technology of coal mining with inclined bedding and stabilization of the quality of coal shipped to consumers. Crushing and loading complexes. The use of combined motor and rail transport. Two-stage coal mining technology with averaging on a conveyor belt. Cyclic and continuous technology in coal mines. Methods for the transition to a two-level technology for mining high benches with transverse panels and methods for optimizing the parameters of the development system elements and performance indicators.

KNOWLEDGE, SKILLS AND ABILITIES UPON COMPLETION OF THE COURSE

As a result of mastering the course, graduates must master the skills: design of continuous and cyclic and continuous technology at coal mines, complete set of technological complexes of equipment and optimization of the mining schedule when combining flow technology of coal mining and cyclic-flow technology of stripping operations, preparation of a feasibility study feasibility of switching to a combined road-conveyor transport.

MASTER STUDETN SHOULD KNOW:

- features of the technology of mining operations in open pit mining of obliquely and steeply lying coal seams;
- continuous technology of coal mining;
- cyclic and continuous technology of stripping operations;
- ways of transition to a two-level technology of working out high benches with transverse panels;
- methods for optimizing the parameters of the development system elements and performance indicators during the transition to the cyclical-flow technology of stripping operations.

MASTER STUDENT SHOULD BE ABLE TO:

- draw up a technical assignment and carry out work on the design of flow and cyclic flow technology at coal mines;
- complete technological complexes of equipment and optimization of the mining schedule when combining the flow technology of coal mining and the cyclical flow technology of stripping operations;
- to draw up a feasibility study of the feasibility of switching to a combined road-conveyor transport.

Work placement

CODE – AAP252

CREDITS – 10

PURPOSE AND OBJECTIVES OF THE COURSE

Production practice is a compulsory part of the training of graduate students,

contributing to the expansion and consolidation of theoretical and practical knowledge acquired in the learning process; acquiring and improving practical skills, knowledge, abilities, competencies master's program.

Objectives: the formation and development of professional knowledge; the consolidation of theoretical knowledge in the disciplines of direction and special disciplines of master's programs; preparation of reports on the results of organizational – administrative activity; mastering of necessary professional competences in the chosen direction of specialized training, including in respect of staff in contracted services and contract managers; collection of factual material for the preparation of a thesis.

Tasks:

- checking the possibilities of independent work of the future master in the conditions of a specific organization;
- mastering the basic practical skills of working under the guidance of qualified specialists;
- acquisition by undergraduates of practical experience of independent work in the chosen specialty;
- collection, processing and analysis of the initial factual material necessary for the completion of the final qualification work.

BRIEF DESCRIPTION OF THE COURSE

The basis for consolidating theoretical knowledge and practical skills is a high-quality student's practical training. Despite the fact that the production organization, due to the specifics of the activity, cannot always provide the trainee with a variety of types of mining operations and an appropriate workplace, the master's student should strive to take the initiative during the production practice and try to collect materials for the master's thesis. From the moment of admission of undergraduates to practice in labor collectives, they are subject to the general labor legislation, labor protection rules and internal regulations in force at this enterprise or division.

Research practice

AAF – 220,221

CREDIT – 16

Research practice is one of the elements of the educational process for the preparation of masters. It contributes to the consolidation and deepening of the theoretical knowledge of undergraduates obtained during training, the ability to set tasks, conduct research, analyze the research results and draw conclusions, acquire and develop the skills of independent research work.

The program of research practice of undergraduates studying in a specific

direction of master's training is developed by the scientific supervisor of the master's program in accordance with the requirements of the master's program and is reflected in the individual task for research practice.

Research topics should correspond to the scientific direction of the work of the specialized department, as well as meet the tasks of theoretical, practical, applied importance for various sectors of the national economy.

PURPOSE AND OBJECTIVES OF THE PRACTICE

The main goal of the research practice of a master student is to develop the ability to independently carry out research work related to solving complex professional problems in innovative conditions.

Research work is carried out by a master student under the guidance of a scientific advisor. The direction of research work of a master student is determined in accordance with the master's program and the topic of the master's thesis.

THE TASKS OF R&D ARE:

- ensuring the formation of professional scientific research thinking of undergraduates, the formation of a clear idea of the main professional tasks, ways to solve them;
- the formation of skills to use modern technologies for collecting information, processing and interpreting the obtained experimental and empirical data, possession of modern research methods;
- ensuring readiness for professional self-improvement, the development of innovative thinking and creative potential, professional skills;
- independent formulation and solution of problems arising in the course of research and teaching activities and requiring in-depth professional knowledge;

At the end of the practice, no later than ten days later, a meeting of the department is held, where undergraduates present brief reports on the specifics of the work studied.

The specifics of this type of practice determines special requirements for the preparation of a master's student in the research part of the program. Special requirements include:

• availability of specific specific knowledge on the scientific problem studied by the undergraduate;

• the ability to practically carry out scientific research, experimental work in a particular scientific field related to the master's thesis;

• ability to work with specific software products and specific Internet resources, etc.;

• ability and willingness to formulate and solve problems arising in the course of research activities requiring in-depth professional knowledge;

• ability and willingness to choose the necessary research methods, modify existing and develop new methods, based on the objectives of a particular research;

• the ability and willingness to process the results obtained, analyze and

interpret them, taking into account the available literature data;

• ability and willingness to conduct bibliographic work with the involvement of modern information technologies.

At the end of the practice, the undergraduate draws up a written report and submits it to the graduating department, together with the opinion of the scientific director of the organizations. The practice report should contain information about the specific work performed by him during the practice period. The report is accompanied by the text of the initial version of the introduction to the master's thesis prepared during the practice and the bibliographic list compiled by the trainee.

The report is defended in the commission, which includes scientific leaders of magistrates and teaching staff of the department.

The final act of practice is the design and assessment of undergraduates.

12 Preparation and defense of a master's project

CODE – ECA 206
CREDITS –12

THE PURPOSE OF THE MASTER'S PROJECT

is to demonstrate the level of scientific/research qualification of the master's student, the ability to independently conduct scientific research, test the ability to solve specific scientific and practical problems, knowledge of the most general methods and techniques for solving them.

SHORT DESCRIPTION

Master's project – final qualification research work, which is a generalization of the results of independent studies undergraduates one of the pressing problems of a particular specialty relevant branch of science that has internal unity and reflects the progress and results of the development of the chosen topic.

Master's project – the result of experimental research work of a master's student, which was carried out during the entire period of training of a master's student.

The defense of the master's project is the final stage of the master's training. The Master's thesis / project must meet the following requirements –

- the work must conduct research or solve current problems in the field of mining;
- the work should be based on identifying important scientific problems and solving them;
- decisions must be scientifically sound and reliable, have internal unity;
- the project must be written individually.

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Рецензия

на образовательную программу (CURRICULUM PROGRAM) **7М072 - «ГОРНАЯ ИНЖЕНЕРИЯ»** Магистр технических наук, составленной кафедрой «Горное дело» НАО «Казахский национальный исследовательский технический университет имени К.И. Сатпаева»

Рецензируемая образовательная программа (далее ОП) по научно-педагогическому направлению представляет собой систему документов, разработанную КазНИТУ имени К.И.Сатпаева с учетом требований рынка труда на основе Государственного образовательного стандарта послевузовского образования РК 2018 года.

Содержание образовательной программы магистратуры состоит из: теорётического обучения, включающее изучение циклов базовых и профилирующих дисциплин; практической подготовки магистрантов: различные виды практик, научных или профессиональных стажировок; научно-исследовательской работы, включающую выполнение магистерской диссертации и итоговой аттестации.

В соответствии с требованиями рынка достаточно полно составлен паспорт специальности. Четко обозначены объекты и виды будущей профессиональной деятельности выпускника.

В ОП достаточно полно раскрыты цели, задачи, требования к уровню подготовки магистранта на основе Дублинских дескрипторов второго уровня высшего образования (магистратура) и отражают освоенные компетенции, выраженные в достигнутых результатах обучения (раздел 5), компетенции по завершению обучения (раздел 6).

Таким образом, содержание ОП «Горная инженерия» разработана на основе развития многоуровневой системы подготовки кадров, фундаментальности и качества обучения, непрерывности и преемственности образования и науки, единства обучения, воспитания, исследовательской и инновационной деятельности, направленной на максимальное удовлетворение запросов работодателей.

Освоение настоящей ОП позволит выпускнику обрести углубленные знания и умения второго уровня (магистратура) в области горного дела, а ВУЗу подготовить высококвалифицированные научных и научно-педагогические кадры высшей квалификации.

Изложенное позволяет сделать вывод, что разработанная образовательная программа **7М072** - «ГОРНАЯ ИНЖЕНЕРИЯ» Магистр технических наук в области горного дела может быть одобрена и рекомендована для ее реализации в НАО «КазНИТУ им. К.И. Сатпаева» при их подготовке.

Глава производственного Департамента
АО "Алтыналмас" Б.Бахрамов