Mining and Metallurgical Institute named after O.A. Baikonurov

Department of "Mining"

EDUCATIONAL PROGRAM

7M07203 - "Mining Engineering"

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

Almaty, 2022

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

Protocol no. 13 from "28" 04 2022

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

Protocol no. 7 from "26" 04 2022

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

Full name	Academic degree/ academic title	Post	Place of work	Signature
Chairman of the Academic ommittee:				
Moldabaev S.K.	doctor of technical sciences, professor	Head of the Department	KazNTU 72-45, 87015183265	
Teaching staff:				
Yusupov K.A.	doctor of technical sciences	professor	KazNTU	
Sandibekov M.N.	candidate of technical sciences	professor	KazNTU	
Employees:				
Bitimbayev M.Z.	doctor of technical sciences, professor	Expert of Kazakhmys Corporation LLP	Member of the Board of Directors of Kazakhaltyn Mining and Metallurgical Concern JSC-	
Bahramov B.A.	master of technical sciences	Managing Director of Production	JSC "Altynalmas", Almaty	
Students:				
Orynbayev B.A.	doctoral student 2 course	Senior Engineer of the Department	NP Interrin LLP, Almaty	
Amanzholov M.T.	master 2 courses	Chief Operating Officer	Mongold PTE Limited	

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;

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

EOM RK – Ministry of Science and Higher Education of the Republic of Kazakhstan;

OP – educational program;

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

SROP – independent work of a student with a teacher (independent work of a student (undergraduate, doctoral student) with a teacher);

RUP – a working curriculum**;**

QED – 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

It is intended for the implementation of specialized bachelor's degree training in the educational program 7M07203 - "Mining Engineering" at Satbayev University and was developed within the framework of the direction "Manufacturing and processing industries".

This document meets the requirements of the following legislative acts of the Republic of Kazakhstan and regulatory documents of the Ministry of Education and Science of the Republic of Kazakhstan:

– The 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;

– The Law of the Republic of Kazakhstan "On Amendments and Additions to Some Legislative Acts of the Republic of Kazakhstan on the expansion of academic and managerial independence of higher educational institutions" dated 04.07.18, No. 171-VI;

– Order of the Minister of Education and Science of the Republic of Kazakhstan dated 30.10.18, No. 595 "On approval of Standard Rules for the activities of educational organizations of appropriate types";

– State mandatory standard of higher education (Appendix 7 to the Order of the Minister of Education and Science of the Republic of Kazakhstan dated 31.10.18 No. 604;

– Resolution of the Government of the Republic of Kazakhstan dated 19.01.12 No. 111 "On approval of Standard rules for admission to education organizations implementing educational programs of higher education" with amendments and additions dated 14.07.16 No. 405;

– Resolution of the Government of the Republic of Kazakhstan dated December 27, 2019 No. 988 "On approval of the State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020-2025";

– Resolution of the Government of the Republic of Kazakhstan dated 31.12.2019 No. 1050 "On approval of the State Program of Industrial and Innovative Development of the Republic of Kazakhstan for 2020-2025";

– "National Qualifications Framework", approved by the Protocol of 16.06.2016. Republican Tripartite Commission on Social Partnership and Regulation of Social and Labor Relations;

– Industry qualification Framework "Mining and Metallurgical Complex" dated 30.07.2019 No. 1;

– Strategy "Kazakhstan-2050": a new political course of the established state. Message of the President of the Republic of Kazakhstan - Leader of the Nation N.A. Nazarbayev to the people of Kazakhstan. Astana, 14.12.2012;

– "New development opportunities in the conditions of the Fourth Industrial Revolution". Message of the President of the Republic of Kazakhstan N. Nazarbayev to the people of Kazakhstan. 10.01.2018;

– "The third modernization of Kazakhstan: global competitiveness". Message of the President of the Republic of Kazakhstan N.Nazarbayev to the people of Kazakhstan. 31.01.2017

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

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

– the bowels of the Earth, including production facilities, equipment and technical systems for their development;

– equipment and technologies for ensuring safe and effective implementation of geotechnologies for extraction, processing of solid minerals and rational use of natural resources;

– mining machines and equipment of various functional purposes (for open and underground mining);

– measures to ensure the safe operation of mining machinery and equipment and to reduce their anthropogenic impact on the environment.

Types and tasks of the graduate's professional activity

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

Organizational and managerial:

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

Production and technological:

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

Experimental research:

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

Design and analytical:

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

- collection and analysis of information source data for design;
- development of design documentation for the construction, operation and reconstruction of mining enterprises;
- conducting a preliminary feasibility study of design calculations;
- implementation of projects in production and author's supervision.

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

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

2 The purpose and objectives of the educational program

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

- training of a highly qualified specialist in the field of solid minerals development, meeting the requirements of modern high-tech production, capable of carrying out design and production and technological activities in this field at a high technical level, engaging in organizational and managerial activities in the public and private sector, mining enterprises, nuclear industry, design, educational and scientific-research organizations of any form of ownership
- provision of training for mining enterprises of professionally educated and competent specialists capable of working in primary engineering and technical positions;
- effectively conduct the extraction of natural resources in various mining and geological and mining engineering conditions based on the study of general education, basic and specialized disciplines
- providing in-depth knowledge of natural science, general technical and economic nature as the foundation of professional education.

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

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

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

- study of a cycle of general education disciplines to provide social and humanitarian education based on the laws of socio-economic development of society, history, modern information technologies, the state language, foreign and Russian languages;
- the cycle of core disciplines is focused on the study of key theoretical aspects of engineering and technology to ensure the safe and effective implementation of various technologies for the extraction, processing of solid minerals and rational use of natural resources;

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

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

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

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

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

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

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

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

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

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

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

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

– the ability to independently acquire, comprehend, structure and use new knowledge and skills in professional activities, develop their innovative abilities;

– the ability to independently formulate research goals, establish the sequence of solving professional tasks;

– the ability to apply in practice the knowledge of fundamental and applied sections of disciplines that determine the orientation (profile) of the master's degree program;

– the ability to professionally choose and creatively use modern scientific and technical equipment to solve scientific and practical problems;

– the ability to critically analyze, present, defend, discuss and disseminate the results of their professional activities;

– proficiency in the preparation and execution of scientific and technical documentation, scientific reports, reviews, reports and articles;

– willingness to lead a team in the field of their professional activities, tolerantly perceiving social, ethnic, confessional and cultural differences;

– readiness to communicate orally and in writing in a foreign language to solve the tasks of professional activity.

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

research activity:

- the ability to form diagnostic solutions

to professional problems by integrating fundamental sections of sciences and specialized knowledge acquired during the development of the master's degree program;

– the ability to independently conduct scientific experiments and research in the professional field, generalize and analyze experimental information, draw conclusions, formulate conclusions and recommendations;

–the ability to create and explore models of the studied objects based on the use of in-depth theoretical and practical knowledge in the field of mineral deposits development, innovative technologies in the design and operation of quarries, mines, mines, capable of implementing their professional knowledge, skills and abilities in public and private management, mining enterprises, nuclear industry in design and scientific- research organizations of any form;

– scientific and production activities:

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

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

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

– project activities:

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

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

– organizational and managerial activity:

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

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

– scientific and pedagogical activity:

– ability to conduct seminars, laboratory and practical classes;

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

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

4 Passport of the educational program

4.1 General information

№	Field name	Note
1	Code and ification of the field ucation	7M07 – Engineering, manufacturing and construction industries
2	Code and ification of training areas	7M072 – Manufacturing and processing industries
3	Group of educational programs	M116 – Gornoye delo i dobycha poleznykh iskopayemykh
4	Name of the educational program	Mining Engineering
5	Brief description of lucational program	Mining operations in open-pit, underground and geotechnological mining, construction of mines and underground structures. The main technological processes: preparation of rocks for excavation, excavation and loading operations, transportation, unloading and dumping operations, primary processing of extracted minerals.
6	Purpose of the EP	The purpose of the educational program is to train a highly qualified specialist in the field of solid minerals development, meeting the requirements of modern high-tech production, able to carry out design and production and technological activities in this field at a high technical level, engage in organizational and managerial activities in the public and private sector, mining enterprises, nuclear industry, design, educational and research organizations of any form of ownership
7	Type of EP	New
8	The level of the NRK	Level 7 – higher education and practical experience
9	ORC Level	Level 7 – a wide range of special (theoretical and practical) knowledge (including innovative).
10	Distinctive features of the EP	No
11	List of competencies educational program:	
12	Learning outcomes of the educational ram:	
13	Form of training	Full - time full
14	Duration of training	2 years
15	Volume of loans	120
16	Languages of instruction	Kazakh/Russian
17	Academic degree awarded	Master of Technical Sciences
18	Developer(s) and authors:	Moldabaev S.K.

4.2 Matrix of correlation of learning outcomes in the educational program as a whole with the competencies being formed

Key competencies /Learning outcomes	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9
KC1 Professional competencies	X								
KC 2 Research competencies				X	X				X
KK 3 Basic competencies and knowledge	X	X							
KK 4 Communication competencies		X							
KK 5 Universal competencies									
KK 6 Management competencies			X			X	X	X	
KK 7 Cognitive competencies									X
KK 8 Creative competencies							X		
KK 9 Information and communication competencies						X			

4.3 The relationship between the achievability of the formed learning outcomes according to the educationalprogram and academic disciplines

№	Name of the discipline	Brief description of the discipline	Number of credits	Generated learning outcomes (codes)								
				LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9
Cycle of basic disciplines M-1. Basic training module (university component)												
1	English language (professional)	The course is designed for undergraduates of technical specialties to improve and develop foreign language communication skills in professional and academic fields. The course introduces students to the general principles of professional and academic intercultural oral and written communication using modern pedagogical technologies. The course ends with a final exam. Undergraduates also need to study independently (MIS).	5			X						
2	History and philosophy of science	The subject of philosophy of science, dynamics of science, specifics of science, science and pre-science, antiquity and the formation of theoretical science, the main stages of the historical development of science, features of classical science, non-classical and post-non-classical science, philosophy of mathematics, physics, engineering and technology, specifics of engineering sciences, ethics of science, social and moral responsibility of a scientist and engineer.	3							X		
3	Higher school pedagogy	The course is intended for undergraduates of the scientific and pedagogical magistracy of all specialties. Undergraduates will master the methodological and theoretical foundations of higher school pedagogy, plan and organize the processes of teaching and upbringing, master the communicative technologies of subject-subject interaction between a teacher and a master in the educational process of a university.	3							X	X	
4	Psychology of management	The purpose of the discipline is to familiarize students with modern ideas about the role and multidimensional content of the psychological component of managerial activity; to increase the psychological culture of the future master for the successful implementation of professional activities and self-improvement. Studies the main stages, trends and trends in the development of Kazakh and foreign management psychology, the composition and structure of management activities. Special attention is paid to the psychological component of the managerial function, the individual	3							X	X	

		characteristics of the manager, the ethical and cultural components of the manager, the basics of interaction.										
Cycle of profile disciplines M-2. Profile training module (optional component)												
5	Geotechnological processes in the development of mineral deposits	The course is aimed at studying non-traditional approaches to the implementation of geotechnological processes (mechanical, thermal, based on chemical reactions), methodology for identifying and evaluating the influence of physical and geological factors on the course of geotechnological processes, establishing requirements for the physical and geological conditions of the deposit, which determine the possibility of using geotechnological methods.	5		X	X	X	X				X
6	Innovative methods of drilling and blasting operations	The course is aimed at familiarization with the methodology of research to improve the quality of crushing rocks, innovative technological solutions for the design features of the charge of explosive diseases, the mathematical justification of the parameters of drilling and blasting after performing laboratory, experimental and theoretical studies using numerical simulation of the explosive impact on massive rock structures.	5	X	X	X		X		X		X
7	Innovative installation and commissioning methods for machines and equipment	Advanced methods of installation, adjustment, diagnostics of technological equipment, innovative methods of testing, methods and types of diagnostics, installation work using modern methods and monitoring of the technical condition (welding, rolling, basic plumbing work, adjustment and adjustment work).	5	X				X		X		X
8	Test methods for mining machines and stationary units	The course will provide the study of methods for testing mining machines and stationary installations for reliability and durability, solving problems of resources and durability, for load modes and operating conditions of technological machines, for maintaining maximum loads that cause static damage (from vibrations, fatigue, etc.), for checking load modes and gaining skills to perform load measurement.	5	X						X		X
9	Process regulations and mining planning	The course will provide competencies in drawing up technological regulations for the implementation of new types of mining operations and planning mining operations to ensure the completeness and integrated development of the deposit reserves in accordance with the Unified Rules for the Protection of Subsoil. Upon completion of the course, undergraduates should know the procedure, content and requirements for the development of technological regulations and a plan for the development of mining operations.	5		X		X	X	X			
10	Technology of integrated development of underground	The course, as an important geo-resource in the system of scientific and technological potential of the country, is aimed at familiarizing	5		X		X	X				

	space	with the problems of integrated development of subsoil, best practices for the integrated use of underground space as underground industrial enterprises, engineering and transport communications and environmental facilities, as well as the development of technologies for the construction of workings of a large cross section.										
11	The Code on Subsurface Resources and legal regimes in subsurface use	The course will improve the legal literacy of undergraduates through familiarization and use with the regime of subsoil use, the procedure for exercising state administration and regulation in the field of subsoil use, the peculiarities of the emergence, exercise and termination of rights to subsoil plots, the legal status of subsoil users, the conduct of relevant operations, issues of subsoil use and disposal of the right to subsoil use and other relations related to the use of subsoil resources, the contract and license for subsoil use, the termination of the right to subsoil use.	5	X			X			X		
12	Continuous Career Design Methodology	The course is aimed at mastering the methodology of continuous design of open pits in market conditions, taking into account existing and new methods of intensive construction, technical re-equipment, phased development of deposits, adjustment of the mining transport system, reconstruction and operation of open pits.	5		X	X	X	X				
13	Rational technologies of vertical mining operations	The course will allow you to master advanced technologies for conducting vertical mine workings, methods for designing the construction of vertical mine workings using software products in relation to specific operating conditions, selected materials and technological schemes for construction, and recommend science-based solutions to the problems of building vertical mine workings.	5		X	X		X	X			
14	Digital technology in mining SMART Mine	The course is aimed at mastering digital technologies in mining, up to the creation of a smart mine - Smart Mine. As a result, undergraduates will be able to master the structure and content of works on automated production of mining operations and maintenance of technical, technological, economic, financial documentation. To do this, they will study data flows, data processing, storage and visualization, the SQL and Python programming language, data collection using MES systems, the concept of LIMS, the collection and calculation of finished products using software products, and the technology of situational centers.	5			X		X				X
15	Highly rhythmic safe production of mining operations in deep quarries	The course introduces the theory and practice of implementing advanced technologies in the open-pit mining of mineral deposits to great depths with an in-depth study of the method of mining operations with steep-slope layers on quarry fields of elongated and rounded shape, the method of automated establishment of optimal calendar volumes of mining operations when working off ledges of	5		X	X	X	X				X

		rock overburden and ore from top to bottom with transverse panels in adjacent steep-slope layers and a set of studies on the completeness of safe extraction of near-contour and deep reserves based on optimization of the final contours of the quarry and the use of innovative technological complexes in the zone of completion of deep quarries.										
16	Design of underground mines	The course is aimed at instilling the skills of computer design of underground mines in their design and operation using integrated mining and geological information systems, including working with database files, creating and analyzing points, strings, frames, digital surface models and block models, drawing underground workings.	5		X			X				
17	Intensification of reclamation of lands disturbed by open mining operations	The course is aimed at studying methods of restoring the fertile soil layer and measures to protect the environment based on provisions on the use of natural resources with a limited anthropogenic impact on the environment, scientific aspects of mining and biological reclamation and includes a set of studies on the restoration of saline lands.	5	X	X	X		X				X
18	Methodology of designing of underground construction	The course covers a set of methods for designing the construction of underground structures for mining and technological, mining, financial and economic, labor protection and safety of parts, taking into account the peculiarities of mining and geological conditions of the occurrence of an array of rocks, carrying out the necessary scientific research.	5		X	X		X				
19	Methods of coal mining in sections	The course covers the latest achievements in the field of open-cast mining of coal deposits, including the features of the introduction of in-line and cyclic-in-line technologies with inclined occurrence of coal seams, averaging and loading complexes to stabilize the quality of marketable coal, the use of combined road and rail transport, two-stage coal mining technology with averaging over conveyor belt and internal dumping with a change in the order of mining sections of a quarry field.	5		X	X	X	X				
20	Modernization of the processes of horizontal and inclined mine workings	The course is aimed at studying advanced technologies for horizontal and inclined mining based on the improvement of basic technological processes, the practice of sinking workings using selective and drilling combines, technology for the construction of inclined workings from top to bottom and vice versa, from bottom to top.	5	X	X			X		X		
21	Rational technologies for development of placer deposits	The course is aimed at studying the ways to improve the efficiency of the development of placer deposits by open, underwater and underground methods. Based on the results of scientific research and the main provisions for the development of placers, examples of	5		X	X	x	X				X

		gold extraction at the junction of geology, geotechnology and mineral processing are presented.										
22	Resource-saving complex development of mineral resources	The course will provide knowledge on solving the problem of depletion of subsoil reserves through the completeness of extraction and resource-saving their integrated development based on the analysis of advanced technologies and ways to reduce costs with additional separate extraction and redistribution of associated minerals involved in the development, establishing design features and planning of mining operations in integrated development subsoil and performing a feasibility study on the feasibility of involving associated minerals in the development of advanced developments in this area.	5		X	X	X	X				
23	Technology of laying-of the develped space	The course is aimed at studying the latest achievements in the application of development systems with the laying of the developed space, covering the processes of preparation and methods of transportation of the laying mixture with the technology of its placement on the border of the treatment excavation. Particular attention is paid to reducing the cost of preparing the filling mixture in the process of improving their characteristics: hydraulic, pneumatic, hardening, gravity and mechanical.	5		X	X		X	X			X
24	Technology of construction of metropolitan	The course is aimed at instilling skills in the selection and calculation of structures of underground metro facilities based on the study of methods of fastening underground structures and sinking of construction shafts, the preparatory period of construction, technology and organization of construction of approach and inclined workings, distillation tunnels with the help of mining shields, technological schemes for the construction of metro stations, including three-vaulted.	5		X	X		X	X			X

4.4 Information about modules/disciplines

№	Name of the discipline	Brief description of the discipline (30-50 words)	Number of credits	Formed competencies (codes)
Cycle of general education disciplines University component				
1	English language (professional)	The course is designed for undergraduates of technical specialties to improve and develop foreign language communication skills in professional and academic fields. The course introduces students to the general principles of professional and academic intercultural oral and written communication using modern pedagogical technologies. The course ends with a final exam. Undergraduates also need to study independently (MIS).	5	KK3, KK7, KK9
2	History and philosophy of science	The subject of philosophy of science, dynamics of science, specifics of science, science and pre-science, antiquity and the formation of theoretical science, the main stages of the historical development of science, features of classical science, non-classical and post-non-classical science, philosophy of mathematics, physics, engineering and technology, specifics of engineering sciences, ethics of science, social and moral responsibility of a scientist and engineer.	3	KK3, KK7, KK9
3	Higher school pedagogy	The course is intended for undergraduates of the scientific and pedagogical magistracy of all specialties. Undergraduates will master the methodological and theoretical foundations of higher school pedagogy, plan and organize the processes of teaching and upbringing, master the communicative technologies of subject-subject interaction between a teacher and a master in the educational process of a university.	3	KK3, KK7, KK9
4	Psychology of management	The purpose of the discipline is to familiarize students with modern ideas about the role and multidimensional content of the psychological component of managerial activity; to increase the psychological culture of the future master for the successful implementation of professional activities and self-improvement. Studies the main stages, trends and trends in the development of Kazakh and foreign management psychology, the composition and structure of management activities. Special attention is paid to the psychological component of the managerial function, the individual characteristics of the manager, the ethical and cultural components of the manager, the basics of interaction.	3	KK4, KK5

Cycle of profile disciplines M-2. Profile training module (optional component)				
5	Geotechnological processes in the development of mineral deposits	The course is aimed at studying non-traditional approaches to the implementation of geotechnological processes (mechanical, thermal, based on chemical reactions), methodology for identifying and evaluating the influence of physical and geological factors on the course of geotechnological processes, establishing requirements for the physical and geological conditions of the deposit, which determine the possibility of using geotechnological methods.	5	KK3, KK7, KK8, KK9
6	Innovative methods of drilling and blasting operations	The course is aimed at familiarization with the methodology of research to improve the quality of crushing rocks, innovative technological solutions for the design features of the charge of explosive diseases, the mathematical justification of the parameters of drilling and blasting after performing laboratory, experimental and theoretical studies using numerical simulation of the explosive impact on massive rock structures.	5	KK4, KK5
7	Innovative installation and commissioning methods for machines and equipment	Advanced methods of installation, adjustment, diagnostics of technological equipment, innovative methods of testing, methods and types of diagnostics, installation work using modern methods and monitoring of the technical condition (welding, rolling, basic plumbing work, adjustment and adjustment work).	5	KK4, KK5
8	Test methods for mining machines and stationary units	The course will provide the study of methods for testing mining machines and stationary installations for reliability and durability, solving problems of resources and durability, for load modes and operating conditions of technological machines, for maintaining maximum loads that cause static damage (from vibrations, fatigue, etc.), for checking load modes and gaining skills to perform load measurement.	5	KK1, KK3, KK8, KK9
9	Process regulations and mining planning	The course will provide competencies in drawing up technological regulations for the implementation of new types of mining operations and planning mining operations to ensure the completeness and integrated development of the deposit reserves in accordance with the Unified Rules for the Protection of Subsoil. Upon completion of the course, undergraduates should know the procedure, content and requirements for the development of technological regulations and a plan for the development of mining operations.	5	KK1, KK3, KK8, KK9
10	Technology of integrated development of underground space	The course, as an important geo-resource in the system of scientific and technological potential of the country, is aimed at familiarizing with the problems of integrated development of subsoil, best practices for the integrated use of underground space as underground industrial enterprises, engineering and transport communications and environmental facilities, as well as the	5	KK1, KK3, KK8, KK9

		development of technologies for the construction of workings of a large cross section.		
11	The Code on Subsurface Resources and legal regimes in subsurface use	The course will improve the legal literacy of undergraduates through familiarization and use with the regime of subsoil use, the procedure for exercising state administration and regulation in the field of subsoil use, the peculiarities of the emergence, exercise and termination of rights to subsoil plots, the legal status of subsoil users, the conduct of relevant operations, issues of subsoil use and disposal of the right to subsoil use and other relations related to the use of subsoil resources, the contract and license for subsoil use, the termination of the right to subsoil use.	5	KK1, KK3, KK8, KK9
12	Continuous Career Design Methodology	The course is aimed at mastering the methodology of continuous design of open pits in market conditions, taking into account existing and new methods of intensive construction, technical re-equipment, phased development of deposits, adjustment of the mining transport system, reconstruction and operation of open pits.	5	KK3, KK7, KK9
13	Rational technologies of vertical mining operations	The course will allow you to master advanced technologies for conducting vertical mine workings, methods for designing the construction of vertical mine workings using software products in relation to specific operating conditions, selected materials and technological schemes for construction, and recommend science-based solutions to the problems of building vertical mine workings.	5	KK3, KK7, KK8, KK9
14	Digital technology in mining SMART Mine	The course is aimed at mastering digital technologies in mining, up to the creation of a smart mine - Smart Mine. As a result, undergraduates will be able to master the structure and content of works on automated production of mining operations and maintenance of technical, technological, economic, financial documentation. To do this, they will study data flows, data processing, storage and visualization, the SQL and Python programming language, data collection using MES systems, the concept of LIMS, the collection and calculation of finished products using software products, and the technology of situational centers.	5	KK3, KK7, KK9
15	Highly rhythmic safe production of mining operations in deep quarries	The course introduces the theory and practice of implementing advanced technologies in the open-pit mining of mineral deposits to great depths with an in-depth study of the method of mining operations with steep-slope layers on quarry fields of elongated and rounded shape, the method of automated establishment of optimal calendar volumes of mining operations when working off ledges of rock overburden and ore from top to bottom with transverse panels in adjacent steep-slope layers and a set of studies on the completeness of safe extraction of near-contour and deep reserves based on optimization of the final contours of the quarry and the use of	5	KK3, KK7, KK9

		innovative technological complexes in the zone of completion of deep quarries.		
16	Design of underground mines	The course is aimed at instilling the skills of computer design of underground mines in their design and operation using integrated mining and geological information systems, including working with database files, creating and analyzing points, strings, frames, digital surface models and block models, drawing underground workings.	5	KK3, KK7, KK9
17	Intensification of reclamation of lands disturbed by open mining operations	The course is aimed at studying methods of restoring the fertile soil layer and measures to protect the environment based on provisions on the use of natural resources with a limited anthropogenic impact on the environment, scientific aspects of mining and biological reclamation and includes a set of studies on the restoration of saline lands.	5	KK3, KK7, KK8, KK9
18	Methodology of designing of underground construction	The course covers a set of methods for designing the construction of underground structures for mining and technological, mining, financial and economic, labor protection and safety of parts, taking into account the peculiarities of mining and geological conditions of the occurrence of an array of rocks, carrying out the necessary scientific research.	5	KK1, KK3, KK8, KK9
19	Methods of coal mining in sections	The course covers the latest achievements in the field of open-cast mining of coal deposits, including the features of the introduction of in-line and cyclic-in-line technologies with inclined occurrence of coal seams, averaging and loading complexes to stabilize the quality of marketable coal, the use of combined road and rail transport, two-stage coal mining technology with averaging over conveyor belt and internal dumping with a change in the order of mining sections of a quarry field.	5	KK4, KK5
20	Modernization of the processes of horizontal and inclined mine workings	The course is aimed at studying advanced technologies for horizontal and inclined mining based on the improvement of basic technological processes, the practice of sinking workings using selective and drilling combines, technology for the construction of inclined workings from top to bottom and vice versa, from bottom to top.	5	KK1, KK3, KK8, KK9
21	Rational technologies for development of placer deposits	The course is aimed at studying the ways to improve the efficiency of the development of placer deposits by open, underwater and underground methods. Based on the results of scientific research and the main provisions for the development of placers, examples of gold extraction at the junction of geology, geotechnology and mineral processing are presented.	5	KK4, KK5
22	Resource-saving complex development of mineral resources	The course will provide knowledge on solving the problem of depletion of subsoil reserves through the completeness of extraction and resource-saving their integrated development based on the analysis of advanced technologies and ways to reduce costs with additional separate extraction and	5	KK4, KK5, KK6

		redistribution of associated minerals involved in the development, establishing design features and planning of mining operations in integrated development subsoil and performing a feasibility study on the feasibility of involving associated minerals in the development of advanced developments in this area.		
23	Technology of laying-of the develped space	The course is aimed at studying the latest achievements in the application of development systems with the laying of the developed space, covering the processes of preparation and methods of transportation of the laying mixture with the technology of its placement on the border of the treatment excavation. Particular attention is paid to reducing the cost of preparing the filling mixture in the process of improving their characteristics: hydraulic, pneumatic, hardening, gravity and mechanical.	5	KK4, KK5, KK6
24	Technology of construction of metropolitan	The course is aimed at instilling skills in the selection and calculation of structures of underground metro facilities based on the study of methods of fastening underground structures and sinking of construction shafts, the preparatory period of construction, technology and organization of construction of approach and inclined workings, distillation tunnels with the help of mining shields, technological schemes for the construction of metro stations, including three-vaulted.	5	KK4, KK5, KK6

5 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
Chairman of the Management Board-
Rector of KazNRTU named after K.Satpayev
M.M. Begentaev
«___» _____ 2022 y.

CURRICULUM
of Educational Program on enrollment for 2022-2023 academic year

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

Form of study: full-time Duration of study: 2 year Academic degree: master of technical sciences

Discipline code	Name of disciplines	Cycle	Total amount in credits	Total hours	Classroom amount lec/lab/pr	SIS (including TSIS) in hours	Form of control	Allocation of face-to-face training based on courses and semesters			
								1 course		2 course	
								1 semester	2 semester	3 semester	4 semester
CYCLE OF BASIC DISCIPLINES (BD)											
M-1. Module of basic training (university component)											
LNG210	English (professional)	BD UC	5	150	0/0/3	105	E	5			
HUM214	Management Psychology	BD UC	3	90	1/0/1	60	E		3		
HUM212	History and philosophy of science	BD UC	3	90	1/0/1	60	E		3		
HUM213	Higher school pedagogy	BD UC	3	90	1/0/1	60	E	3			
Component of choice											
Module methods of scientific research											
MIN258	Innovative methods of drilling and blasting operations	BD CCH	5	150	2/0/1	105	E	5			
TEC297	Innovative installation and commissioning methods for machines and equipment										
MIN260	Geotechnological processes in the development of mineral deposits	BD CCH	5	150	2/0/1	105	E	5			
MIN280	Process regulations and mining planning										
MIN278	Technology of integrated development of underground space	BD CCH	5	150	2/0/1	105	E			5	
TEC281	Test methods for mining machines and stationary units										
CYCLE OF PROFILE DISCIPLINES (PD)											
M-2. Module of professional activity (university component, component of choice)											
Mining Production Support Module											
MIN268	Digital technology in mining SMART Mine	PD UC	5	150	1/0/2	105	E	5			
MIN299	The Code on Subsurface Resources and legal regimes in subsurface use	PD UC	5	150	2/0/1	105	E	5			
MIN297	Rational technologies of vertical mining operations	PD UC	5	150	2/0/1	105	E		5		
MIN259	Continuous Career Design Methodology	PD UC	5	150	2/0/1	105	E			5	
Module for implementing innovations in mining											
MIN273	Design of underground mines	PD CCH	5	150	2/0/1	105	E			5	
MIN211	Methodology of designing of underground construction										
MIN253	Technology of construction of metropolitan	PD CCH	5	150	2/0/1	105	E		5		
MIN285	Modernization of the processes of horizontal and inclined mine workings										
MIN700	Highly rhythmic safe production of mining operations in deep quarries	PD CCH	5	150	2/0/1	105	E		5		
MIN701	Intensification of reclamation of lands disturbed by open mining operations										
MIN295	Technology of laying-of the develped space	PD CCH	5	150	2/0/1	105	E			5	
MIN296	Rational technologies for development of placer deposits										

MIN298	Resource-saving complex development of mineral resources	PD CCH	5	150	2/0/1	105	E			5	
MIN294	Methods of coal mining in sections										
M-3. Practice-oriented module											
AAP229	Pedagogical practice	BD UC	6						6		
AAP256	Research practice	PD, CCH	4								4
M-4. Experimental research module											
AAP251	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	2					2			
AAP241	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	3						3		
AAP254	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	5							5	
AAP255	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	14								14
M-5. Module of final attestation											
ECA205	Preparation and defense of a master's thesis	FA	12								12
Total based on UNIVERSITY:								30	30	30	30
								60		60	

Number of credits for the entire period of study					
Cycle code	Cycles of disciplines	Credits			
			university component (UC)	component of choice (CCH)	Total
BD	Cycle of basic disciplines		20	15	35
PD	Cycle of profile disciplines		25	24	49
	Total for theoretical training:	*0*	*45*	*39*	*84*
	RWMS				*24*
FA	Final attestation	12			12
	TOTAL:	**12**	**45**	**39**	**120**

Decision of the Academic Council of Kazntu named after K.Satpayev. Protocol № 13 от "28" 04 2022 y.

Decision of the Educational and Methodological Council of Kazntu named after K.Satpayev. Protocol № 7 от "26" 04 2022 y.

Decision of the Academic Council of the Mining and Metallurgical Institute. Protocol № 5 от "30" 12 2021 y.

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

Director of the Institute of Mining and _____ **K. Rysbekov**

Head of the Department "Mining" _____ **S. Moldabayev**

Council representative from employers _____ **B. Bakhramov**

6 Brief descriptions of the disciplines

Foreign language (professional)
Professional English for Project Managers
CODE – LNG 210
CREDIT – 5 (0/0/3)
PREREQUISITE –Academic English, Business English, IELTS 5.0-5.5

PURPOSE AND OBJECTIVES OF THE COURSE

The goal of the course is to develop undergraduates ' knowledge of English for their current academic research and to improve their performance in 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. Undergraduates are expected to acquire and expand their business English vocabulary and learn grammatical structures that are often used in the context of management. Course it consists of 6 modules. The 3rd module of the course ends 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 AT THE END OF THE COURSE

After 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 spoken English on topics related to management; write management texts (reports, letters, emails, minutes of meetings), following the 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 psychology
CODE – HUM 214
CREDIT - 3(1/0/1)
PRECONDITION

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course is to study the behavior of individuals and groups of people within organizations; determining psychological and social factors that influence employee behavior. Much attention will also be paid to internal and external motivation of people

The main goal of the course is to apply this knowledge to improve the effectiveness of the organization.

BRIEF DESCRIPTION OF THE COURSE

The course is designed to provide balanced coverage of all the key elements that make up the discipline. It will briefly examine the origins and development of organizational behavior theory and practice, and then examine the main roles, skills, and functions of management with an emphasis on management effectiveness, illustrated by real-life examples and case studies.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

At the end of the course, students will know: the basics of individual and group behavior; basic theories of motivation; basic theories of leadership; concepts of communication, conflict management and stress in the organization.

they will be able to identify the various roles of managers in organizations; look at organizations from the point of view of managers; and understand how effective management contributes to an effective organization.

History and philosophy of science

CODE – HUM 212
CREDIT - 3(1/0/1)
PRECONDITION – HUM208

THE goals AND OBJECTIVES of the COURSE are to reveal the connection between philosophy and science, to highlight the philosophical problems of science and scientific knowledge, the main stages of the history of science, the leading concepts of philosophy of science, modern problems of the development of scientific and technical reality

BRIEF COURSE DESCRIPTION the subject of philosophy of science, science dynamics, the specifics of science, science and pradnya, the antiquity and the emergence of theoretical science, main stages of the historical development of science, characteristics of science, neklassicheskie and post-non-classical science, philosophy, mathematics, physics, engineering and technology, the specifics of engineering Sciences, ethics of science, social and moral responsibility of the scientist and engineer

KNOWLEDGE, SKILLS AT the end of the COURSE-to know and understand the philosophical issues of science, the main historical stages of the development of science, the leading concepts of the philosophy of science, be able to critically evaluate and analyze scientific and philosophical problems, understand the specifics of engineering science, possess the skills of analytical thinking and philosophical reflection, be able to justify and defend their position.

Higher school pedagogy

CODE – HUM 213
CREDIT - 3(1/0/1)
PRECONDITION

THE goals and OBJECTIVES of the COURSE are to familiarize future teachers with the methodological and theoretical foundations of higher school

pedagogy, modern technologies of analysis, planning and organization of training and education, and communication technologies of subject - subject interaction between a teacher and a student in the educational process of a University.

BRIEF description of the COURSE - the subject of higher school pedagogy, methodology of pedagogical science, aspects and trends in the development of modern education, pedagogical activity, the personality of a higher school teacher, the essence and structure of pedagogical activity, modern requirements for competence, communicative competence of a higher school teacher, didactics of higher school, modern pedagogical technologies, the educational process of higher school. active methods and forms of training in the preparation of future specialists, educational work in higher schools, the organization of independent work of students in the conditions of credit technology, the organization of pedagogical control in the conditions of credit technology.

KNOWLEDGE, SKILLS AT the end of the COURSE-to know and understand the current problems of pedagogical science, the laws of pedagogical theories, the essence of pedagogical activity of a University teacher. Master the skills of designing the educational process based on new concepts of training and education; creating a creative and developing environment in the process of training and education. Be competent in solving problems of higher pedagogical education and prospects for its further development; in the use of effective University teaching technologies; the main types of pedagogical communication interaction, organization and management of students ' activities.

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.

Geotechnological processes in the development of mineral deposits

CODE – MIN 260

CREDIT – 5 (2/0/1)

PRECONDITION –

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course is to train specialists for research and production activities in the field of Geotechnology of uranium and other minerals.

The aim of the course is to study geotechnical processes in the development of uranium and other minerals.

BRIEF DESCRIPTION OF THE COURSE

Characteristics of minerals suitable for geotechnical methods of extraction, geotechnical methods of mining mineral deposits, reagents used in geotechnical methods of development, geotechnical processes, protection of the subsoil and liquidation of the enterprise.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

As a result of mastering the course, undergraduates should know the geotechnical processes of production of uranium and other deposits. Get skills and knowledge of opening, mining and processing of uranium and other minerals using geotechnical methods.

Process regulations and mining planning

CODE – MIN 280

CREDIT – 5 (2/0/1)

PRECONDITION –

PURPOSE AND OBJECTIVES OF THE COURSE:

Teach you to develop technological regulations and a plan for the development of mining operations.

BRIEF DESCRIPTION OF THE COURSE:

Necessary sections, requirements for development, production schedule, development plan for all types of mining operations.

KNOWLEDGE, SKILLS, AND SKILLS AT THE END OF THE COURSE.

Know the procedure, content and requirements for the development of technological regulations and planning of mining operations.

Get the skills to develop and coordinate technological regulations and planning of mining operations.

Rational technology of vertical mining

CODE - MIN 297

CREDIT - 5 (1/0/1)

PRE-REQUISIT -

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of studying the discipline "Rational technologies for conducting vertical mine workings" is the mastering of the knowledge necessary for master students to creatively solve the design and construction of vertical mine workings in various mining and geological conditions at a modern engineering and technical

level and to monitor the production of work in the practical implementation of the project.

The main task of studying the discipline is to master the methods of designing the construction of vertical mine workings and their calculation with the widespread use of software products, in relation to specific operating conditions, selected materials and construction technological schemes, as well as methods for choosing a rational technology for their construction.

SHORT DESCRIPTION OF THE COURSE

The main stages of equipment and technology for the construction of vertical shafts in domestic and foreign practice. Purpose and characteristics of the trunks. Preparatory period for construction. Shafts equipment for sinking. Technological schemes of shaft sinking equipment. Advantages and disadvantages of technological schemes, their area of application. Construction of stem mouths and technological waste. The main directions of improving the drilling and blasting method of shaft sinking. Safety requirements for drilling and blasting operations. Loading of rock during sinking of vertical shafts. Lifting during the construction of shafts. Erection of permanent support for vertical shaft sinking. Technical and economic indicators of the construction of various types of supports. Organization of drainage during shaft sinking. Ventilation during shaft sinking and provision of compressed air. Construction of barrel-to-barrel junctions and near-barrel cameras. Installation of pipelines and cables Further improvement of the reinforcement of vertical shafts. Designing the organization of tunneling works and technical and economic indicators.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

The student's competencies, formed as a result of mastering the discipline:

- use of normative legal and instructive documents in their activities; Awareness of the social significance of their future profession, the presence of high motivation to perform professional activities;

- willingness to make a technical and economic assessment of the conditions of construction, investment; to choose space-planning solutions and the main parameters of engineering structures of underground facilities, to calculate their strength, stability and deformability; choose materials for engineering structures of underground and mining buildings, and structures on the surface;

- ability to develop technological schemes and construction schedule, to choose methods, technique and technology of mining and construction works, focusing on innovative developments.

As a result of mastering the discipline, the student must:

Know: basic technologies for the construction of vertical mine workings; scientific and engineering foundations for the choice of technologies for mining and construction works and labor protection during the construction of vertical mine workings; methods of design and calculation of parameters for organizing the construction of vertical mine workings; ventilation schemes and methods for calculating ventilation during vertical mine workings; modern mining equipment for the construction of vertical mine workings and their reinforcement.

Be able to: design the organization of the construction of vertical mine workings; monitor and ensure the correctness of the execution of production targets; substantiate the choice of a set of mining equipment for driving and reinforcing vertical mine workings.

Own: basic legal and regulatory documents for the construction of vertical mine workings; methods for calculating the parameters of the organization of mining and construction works during the construction of vertical mine workings; design methods and technologies for the construction of vertical mine workings.

Innovative methods of securing mining and underground structures

CODE – MIN 271

CREDIT – 5 (2/0/1)

PREREQUISITES

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of studying the discipline is to give undergraduates the knowledge necessary to creatively solve the problem of ensuring the stability of mine workings and underground structures for various purposes during the entire service life, as well as the assimilation by undergraduates of methods and principles of calculating the supports of mine workings and lining of underground structures for strength, stability and rigidity under static and dynamic influences.

The task of studying the discipline is to instill in undergraduates the skills of self-selection of effective ways and means of maintaining underground mine workings based on a comprehensive analysis of geomechanical and mining conditions of construction, and calculation of parameters of underground structures.

BRIEF DESCRIPTION OF THE COURSE

Basic conditions for fixing mining operations. Mechanism of interaction between the Mount and the rock array. Basic requirements for fasteners. Structures of fasteners used in modern experiments. Metal frame fasteners and arched metal fasteners. Monolithic concrete, spray concrete and reinforced concrete fasteners. Reinforced concrete fasteners and anchor fasteners.

New designs of fasteners. Mounting of prefabricated blocks, tubes. Methods of reinforcement by introducing Cork materials into the excavated rock Massif. New materials and fastening equipment for fixing workings.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

- Willingness to provide technical guidance in the design of supports for mine workings and underground structures, as well as willingness to work with general and special purpose software products for modeling geomechanical processes in the array and supports;

- The ability to develop the necessary technical and regulatory documentation as part of creative teams and independently, to monitor the compliance of projects with the requirements of standards, specifications and other regulatory documents of industrial safety; to develop, coordinate and approve, in

accordance with the established procedure, technical, methodological and other documents regulating the procedure, quality and safety of mining and construction work on the construction of supports;

- The ability to organize the process of fixing underground structures and structures using new technologies and modern equipment, to make independent technical decisions;

- Be able to design the main types of concrete, reinforced concrete, sprayed concrete, tubing, wooden and metal (steel) structures for underground buildings and structures.

A MASTER'S STUDENT SHOULD KNOW:

- general patterns of deformation and destruction of rocks of the massif around mine workings;

- methods for determining the load on underground mine workings and structures according to current regulatory documents;

- be able to use regulatory documents for the protection of mine workings and underground structures, the selection and calculation of supports.

A MASTER'S STUDENT SHOULD BE ABLE TO:

- to assess the stability of loose mine workings and underground structures, taking into account the technology of excavation of the host rocks;

- choose the necessary shape and dimensions of the workings according to the condition of stability;

- calculate the structural elements of underground structures for strength, stability and rigidity from the effects of static and dynamic loads.

Continuous Career Design Methodology

CODE – MIN 259

CREDIT – 5 (2/0/1)

PRECONDITION

PURPOSE AND OBJECTIVES OF THE COURSE

Training of specialists for effective operation of quarries in market conditions on the basis of making timely and economically justified decisions on making changes to the project documentation for the mining and transport part and investments.

The objective of the discipline is to study the methodology of continuous design of quarries to ensure that the design documentation corresponds to the optimal development of mining operations.

BRIEF DESCRIPTION OF THE COURSE

The essence of the continuous design of open pit mines in market conditions. Design theory and the main purpose of project documents. Theory and practice of intensive construction, technical re-equipment, stage-by-stage development of deposits, adjustment of the mining transport system, reconstruction and operation of quarries. Production of working drawings when combining integrated information systems. Dynamic programming for determining the position of the working side of the quarry, the volume of ready-to-excavate reserves and the

reserve of work of the quarry at the end of preparation of any horizon. Opportunities for implementing breakthrough technologies in design practice and their practical application.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

After completing the course, the student will master the knowledge of the sequence of application of the basic principles and methods of processing initial quantitative data for making optimal design decisions, depending on the demand and supply for the company's commodity products.

The master's student should know: the theory and practice of continuous design of quarries, types of project documentation, methods of justification of its main parameters and production capacity.

A master's student must be able to: assess the actual state of mining operations and the company's ability to effectively extract minerals with the available amount of mining equipment at minimal cost; make timely and economically sound decisions to make changes to the project documentation for the mining and transport part and investments; promptly prepare design assignments, mining schedules and perform a feasibility study of equipment and technology for open-pit mining of ore and coal deposits.

Technology for integrated development of underground space

CODE – MIN 278

CREDIT – 5 (2/0/1)

PRECONDITION

PURPOSE AND OBJECTIVES OF THE COURSE

Study of scientific and practical bases of complex and effective development of underground space on the basis of analysis and evaluation of fundamental technical solutions from the point of view of their innovation.

BRIEF DESCRIPTION OF THE COURSE

Mineral resources as an important geo-resource in the system of scientific and technological potential of the country. Some problems of integrated development of mineral resources. World experience in integrated use of underground space. Mining companies. Underground industrial enterprises. Underground utilities. Underground transport structures. Underground environmental facilities. Systematization of underground structures by main features. Technology of construction of large cross-section workings. Requirements for the safety of the developed space of mines and mines.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE

As a result of mastering the course, undergraduates should master the following skills:

- To justify the strategy of integrated development of underground space on the basis of analysis and evaluation of technical solutions; the ability to develop technological schemes and construction schedule, choose methods and technology of tunneling and ensure technological and environmental safety of life.

- Regulatory framework for the development of underground space in major cities. Priority directions, objects and schemes of underground space development. Requirements for placing underground structures in an underground space. Comprehensive development of underground space in the design and construction of the metro.

A MASTER'S STUDENT SHOULD KNOW:

- characteristic features of mineral development and development of mining technologies;
- problems of integrated development of mineral resources;
- functions of the geological environment;
- ensuring environmental safety of subsurface resources;
- legal framework for mining operations and facilities;
- design features in the integrated system of preparation of project documentation for mining facilities and the use of underground space;
- requirements for the safety of the developed space of mines and mines.

A MASTER'S STUDENT MUST BE ABLE TO:

- prepare and execute scientific, technical and service documentation;
- assess risks and determine measures to ensure the safety of technological processes in mining production;
- apply in practice the principles of rational use of natural resources and environmental protection;
- organize the work of production units in the field of underground construction;
- draw up standard design, technological and working documents to ensure the rational use of underground space.

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.

Teaching practice

AAP 229

CREDIT – 6

SHORT DESCRIPTION

Pedagogical practice is designed to provide the function of a connecting link between the theoretical knowledge obtained during the mastering of the master's program and the practical activities of introducing this knowledge into the real educational process.

PURPOSE AND OBJECTIVES OF THE PRACTICE

The program of teaching practice is developed on the basis of the State educational standards of postgraduate education in the direction of EP "Mining Engineering".

Teaching practice is an essential component and an integral part of the educational process of graduate students. This type of practice performs the functions of general vocational training in terms of preparing students for teaching activities at the university.

The pedagogical practice of undergraduates is aimed at acquiring practical skills in conducting training sessions.

Practice objectives:

- consolidation of knowledge, abilities and skills acquired by undergraduates in the process of studying the disciplines of the master's program;
- mastering the methodology of preparing and conducting various forms of conducting classes;
- mastering the methodology for analyzing training sessions;
- understanding of modern educational information technologies;
- instilling skills of self-education and self-improvement, promoting the activation of scientific and pedagogical activities of masters;
- development of personal qualities in undergraduates, determined by the general goals of training and education.

ORGANIZATION OF PRACTICE

Pedagogical practice is carried out at the beginning of the second year of master's training for full-time students, after passing the relevant theoretical

disciplines. Its duration is 4 weeks for full-time students, in accordance with the curriculum of the master's preparation.

The practice is carried out at the graduating department or in the educational units of the university.

Before the start of the practice, a meeting of the department is held, at which the undergraduates are provided with all the necessary information on conducting pedagogical practice.

The management of pedagogical practice is entrusted to the supervisor of the undergraduate student, together with whom, in the first week of practice, the undergraduate draws up an individual plan. All the work of the trainee is planned in it.

For the internship, the undergraduate, together with the supervisor, chooses an academic discipline for analyzing classes, as well as conducting classes independently.

The work schedule of undergraduates is drawn up in accordance with the schedule of academic disciplines in agreement with the teaching staff of the department, providing the educational process of master's training.

As a result of the internship, the master student must master the skills of independent pedagogical activity in the professional field on the basis of:

- selection of the content and construction of lessons from the modern requirements of didactics (scientific character);

- actualization and stimulation of the creative approach of undergraduates to conducting classes based on the development of students as subjects of the educational process (creativity);

- taking into account the scientific interests of undergraduates (practice provides for conducting classes in subjects and disciplines corresponding to the research interests of undergraduates).

As a result of the internship, the undergraduate must be able to:

- prepare and conduct training sessions on the instructions of the head of practice, visit and analyze the classes of experienced teachers and their colleagues;

- to formulate and solve their problems arising in the course of pedagogical activity.

FEATURES OF CARRYING OUT THIS KIND OF PRACTICE

The practice of undergraduates is carried out within the framework of the general concept of master's training. The main idea of the practice, which its content should provide, is the formation of technological skills related to pedagogical activities, as well as communication skills that reflect interactions with people. The types of activities of the undergraduate in the process of passing the practice involve the formation and development of strategic thinking, panoramic vision of the situation, the ability to lead a group of people.

1. Study:

- content, forms, directions of activity of the department: planning documents and accounting of the teaching load; minutes of the meeting of the department; teacher plans and reports; student certification documents; normative and regulatory documents of the department;

- teaching materials;

- curricula of academic disciplines, lecture courses, the content of laboratory and practical classes;

- scientific and methodological materials: scientific and methodological developments, topics of scientific directions of the department, scientific and methodological literature.

2. Perform the following pedagogical work:

- attend classes of teachers of the department in various academic disciplines (at least three visits);

- carry out observation and analysis of classes in agreement with the teacher of the discipline (at least two observations)

- independently conduct fragments (parts) of classes in agreement with the supervisor and (or) teacher of the academic discipline;

- independently conduct classes according to the curriculum plan (at least two classes).

- form a methodological package for the selected academic discipline, which includes:

a) lectures on the topic of the chosen academic discipline with an indication of the list of sources used;

b) special tests (7-10);

c) publications on the topic of the academic discipline for the last year (books, magazines, articles, etc.).

3. Take part in the work of the department:

- actively participate in scientific and practical conferences, seminars and meetings of methodological commissions;

- participate in all the activities of the department to create the teaching materials of the department's disciplines;

- carry out individual assignments within the internship program.

Form and type of reporting (diary, report, etc.) of the undergraduate on the internship

Pedagogical practice is considered complete if the master has fulfilled all the requirements of the practice program.

Undergraduates are assessed based on the results of all types of activities in the presence of practical documentation.

The undergraduate must provide, based on the results of the practice:

1) Individual trainee plan (Appendix A);

2) Methodological package for the selected academic discipline;

3) Report on practice (Appendix B).

In the process of paperwork, the student must pay attention to the correctness of paperwork:

- the student's individual plan must have a mark on the implementation of the planned work;

- the practice report should contain a description of the work done; self-assessment of the internship; conclusions and proposals on the organization of practice and the signature of the master student.

All documents must be printed, executed in accordance with the rules of office management and presented in a separate folder with a title page (Appendix B).

Assessment in practice is equated to assessments in disciplines of theoretical education and is taken into account when conducting the results of intermediate (session) certification of students.

The final documentation of students remains at the department.

Research practice

AAP - 256

CREDIT - 4

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.

Master's thesis Defense

CODE – ECA 205

CREDIT -12

THE purpose of the MASTER's THESIS is to:

demonstration of the level of scientific/research qualification of a master's student, the ability to independently conduct a scientific search, checking the ability to solve specific scientific and practical problems, knowledge of the most General methods and techniques for solving them.

BRIEF DESCRIPTION

Master thesis – graduation qualification scientific work, which is a generalization of results of independent issledovaniyeyami one of the urgent problems of a particular specialty of sootvetstvuyushchei science that has internal unity and reflects the progress and results razrabotannoi topics.

Master's thesis-the result of experimental research work of a master's student, conducted during the entire period of training of a graduate student.

The defense of the master's thesis is the final stage of the master's training. A master's thesis must meet the following requirements:

– the work should be carried out research or solve current problems in the mining area;

- the work should be based on the identification of important scientific problems and their solution;

- decisions must be scientifically based and reliable, have internal unity;

- the dissertation work must be written individually.

CHANGE REGISTRATION SHEET

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