NJSC «Kazakh national research technical university named after K. Satbayev»
Institute of geology, oil and mining named after K. Turysov
Department of "Mining"

EDUCATIONAL PROGRAMM "MINING ENGINEERING"

Master of Engineering Science in Educational Program "7M07203 - Mining Engineering"
(scientific and pedagogical direction (2 years)

2-st edition
in accordance with the State Educational Standard of Higher Education 2018

Almaty 2020

The program is designed and signed by the parties:
from Satbayev university:
1. Director of IGP&ME — A.H. Syzdykov
2. Head of the Department of Mining — K.B. Rysbekov
3. Chair of the EMG of the department, assoc. Professor — M.N. Sandibekov

From employers:
Member of the Board of Directors of Kazakhaltyn Minin and Metallurgical Concern JSC, expert of Kazakhmys Corporation LLP, Doctor of Technical Sciences, Professor — M.Zh. Bitimbaev

Director of the Institute of Mining named after. D.A. Kunaev, Academician of NAS RK, Doctor of Technical Sciences, Professor — N.S. Buktukov

Vice-president of JSC "Altynalmas" — B.A. Bahramov

Approved at a meeting of the Educational and Methodological Council of Satbayev University protocol No. 4 of 01/14/2020.

Qualifications:

7M - level of education according to the National qualifications framework
07 - Engineering, manufacturing and construction industries
072 Manufacturing and processing industries (master's degree)

Academic degree: master of technical Sciences (scientific and pedagogical direction)

Training period: 2 years

Professional competence: providing deep scientific and theoretical knowledge and practical skills in the field of solid mineral development in various ways; be able to carry out technical management of mining and blasting operations in the production of solid minerals, construction and operation of underground facilities, directly manage processes at production facilities, study scientific and technical information in the field of mining, processing of solid minerals, construction and operation of underground facilities. Knowledge of the organization of scientific research, use of technical means of experimental industrial testing of equipment and technologies in the extraction, processing of solid minerals, construction and operation of underground facilities, readiness to perform scientific and laboratory research, interpret the results, compile and protect reports.

Content

1 Normative references

Table 1 - a List of regulatory and other documents, links to which are present in the document

№	Document's name	Storage
1	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 from 04.07.18, No. 171-VI.	Registrar Office (RO) http://online.zakon.kz/Document/?doc_id=30118747
2	State compulsory standard of higher education (Appendix 7 to the order of the Minister of Education and Science of the Republic of Kazakhstan dated 10.31.18, No. 604	RO http://online.zakon.kz
3	European Higher Education Qualifications Framework	RO http://ecahe.eu/w/images/7/76/A_Framework_for_Qualifications_for_the_European_Higher_Education_Area.pdf
4	Dublin descriptors	http://ecahe.eu/w/index.php/Dublin_Descriptors
5	GOST 3.1105-2011 Unified system of technological documentation (ESTD). Forms and rules for processing general-purpose documents	http://online.zakon.kz/document/?doc_id=31194118
6	Regulations Satbayev University	Department of Internal Audit

2 Abbreviations used. Terms and Definitions

Table 2 - Abbreviations Used

Abbreviation	Full name
ECTS	European credit transfer and accumulation system
SU	Satbayev university
ME&SRK	Ministry of Education and Science of the Republic of Kazakhstan
PPS	Professorsko-prepodavatel'skiy sostav
EP	Educational program
RO	Registrar Office
SP	OP curriculum

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

Term	Definition
1st Cycle (Бакалавриат)	The level of higher professional education with the award of the academic degree "Bachelor"
Bachelor (Бакалавр)	Academic degree awarded to individuals who have completed the undergraduate education program
Dublin descriptors (Дублинские дескрипторы)	An integral part of the European framework for higher education qualifications describing the degree of development of competencies
Competency (Компетенции)	The ability of students to apply the knowledge acquired in the learning process in the professional activity
Audit (Контроль)	Qualitative characteristic of student assessment system
Credit Education (Кредитная технология обучения)	Learning on the basis of the choice and independent planning by the student of the sequence of studying disciplines using credit as a unified unit of measuring the volume of academic work of the student and teacher
Matrix of Competencies (Матрица компетенций)	Based on Dublin descriptors describing the depth of development of competencies in the framework of the EP
Cycle (Модульное обучение)	The segment of mastering and the depth of mastering by a student of competencies having an intermediate completed cycle
Curriculum (Образовательная программа или ОП)	Description of the educational process based on the achievements of learning outcomes and competencies for obtaining a recognized diploma in a specific field of professional activity
Trainees (students)	Undergraduate students
Assessment (Оценка)	The quantitative characteristic of the student assessment system
Associate Degree, Short Cycle (Прикладной бакалавриат Общеинженерный)	Completion of the minimum undergraduate framework with the development of at least 124 credits of theoretical training
Curriculum (Рабочий учебный план)	A document containing a complete list of academic disciplines of the compulsory component and a component of choice, indicating the number of credits, the sequence of study of disciplines, types of studies and forms of control
Framework of Competencies (Рамка компетенций)	Based on Dublin descriptors describing the depth of development of competencies
Outcome results (Результаты обучения)	Knowledge, skills, qualification characteristics, competence
Sub-competency (Субкомпетенции)	The ability of students to apply the knowledge acquired in the learning process, skills within the framework of a specific competency
Graduate (Студент выпускного курса или выпускник)	Persons from among the students (students) who have successfully mastered the full theoretical course of study

3 Brief description of the program:

1) The purpose of the educational program is to train a highly qualified specialist in the field of solid mineral development, meeting the requirements of modern high-tech production, able to carry out high-tech design and production and technological activities in this area, to engage in organizational and managerial activities in the public and private sector, mining enterprises, the nuclear industry, in the design, educational and research organizations of any form of ownership.

2) Types of employment are:

- in the field of research activities;
- in the field of calculation, design and analytical activities;
- in the field of organizational and managerial activities;
- in the field of production and technological activities;
- in the field of project activities;
- in the field of innovation;
- in the field of program and management activities.

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

According to the Approved Protocol of The meeting of the industry commissions on social partnership and regulation of social and labor relations for mining, chemical, construction and wood-processing, light industry and mechanical engineering dated August 16, 2016 №1, the master of technical Sciences in the field of work corresponds to the following levels of the industry qualifications framework (ORC): level 7-technical Director, development Director.

4 Passport of the educational program

Scope and content of the program

The term of study in the master's program is determined by the amount of academic credits mastered. When the set amount of academic credits is mastered and the expected learning outcomes are achieved for the master's degree, the master's degree program is considered fully mastered. In the scientific and pedagogical master's program, at least 120 academic credits for the entire period of study, including all types of educational and scientific activities of the master's student.

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

The master's program in scientific and pedagogical direction implements educational programs of postgraduate education for the training of scientific and scientific-pedagogical personnel for Universities and scientific organizations that have in-depth scientific and pedagogical and research training.

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

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

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

3) research work, including the implementation of a master's thesis – for scientific and pedagogical master's degree

4) final certification.

The content of the OP "Mining engineering" based on the development of a multi-level system of training, fundamental and quality of training, continuity and continuity of education and science, unity of training, education, research and innovation, aimed at maximum satisfaction of consumer needs should provide:

- obtaining a full-fledged and high-quality professional education in the field of mining (MPI), confirmed by the level of knowledge and skills, skills and competencies, based on the criteria established by the State educational standard, their assessment, both in content and in volume;
- training of professional and competitive specialists in the field of MPI development and creation of new mining production technologies and production management;
- ability to apply knowledge of mathematics, basic and technical Sciences;
- use of methods for analysis and evaluation of experimental results.

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

Objectives of the educational program:

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

- develop and implement measures to improve the environmental safety of mining production;
- be guided in practical engineering activities by the principles of integrated use of the geo-resource potential of the subsurface;
- develop and implement measures to improve and improve the technical level of mining production, ensuring the competitiveness of the organization in modern economic conditions;
- develop plans for the elimination of accidents in the production of works on the extraction and primary processing of solid minerals, as well as in the construction and operation of underground facilities;
- organize your work and labor relations in a team based on modern methods, management principles, advanced production experience, technical, financial, social and personal factors;
- monitor, analyze and evaluate the actions of subordinates, manage a team of performers, including in emergency situations;
- provide training and certification of employees in the field of industrial safety;
- conduct technical and economic analysis, comprehensively substantiate operational decisions taken and implemented, find opportunities to improve production efficiency, assist in providing the company's divisions with the necessary technical data, regulatory documents, materials, equipment;
- carry out work on improvement of production activities, development of projects and programs for the development of the enterprise (divisions of the enterprise);
- analyze the processes of mining, mining and construction industries and complexes of used equipment as objects of management;
- plan and perform theoretical, experimental and laboratory research, process the results obtained using modern information technologies;
- perform patent search, study scientific and technical information, domestic and foreign experience in the field of research;
- develop models of processes and phenomena, evaluate the reliability of the built models using modern methods and information analysis tools;
- make reports on research work independently or as part of creative teams;
- conduct certification tests (research) of the quality of mining enterprise products, equipment, materials and technological processes used;
- to develop measures for the quality control of products;
- use methods of forecasting and assessing the level of industrial safety at production facilities, justify and implement effective measures to reduce industrial injuries;
- conduct technical and economic assessment of solid mineral deposits and underground construction facilities, the efficiency of using technological equipment;

- justify the parameters of the mining enterprise;
- perform calculations of technological processes, productivity of technical means of complex mechanization of works, throughput capacity of transport systems of mining enterprises, make schedules of work organization and calendar plans for production development;
- substantiate design solutions to ensure industrial and environmental safety, economic efficiency of production for operational exploration, mining and processing of minerals, during the construction and operation of underground facilities;
- develop the necessary technical documentation as part of creative teams and independently;
- independently draw up projects and passports of mining and drilling and blasting operations;
- design enterprises for the extraction and processing of solid minerals, as well as the construction of underground facilities using modern information technologies.

5 Requirements for applicants

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

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

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

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

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

6 Requirements for completing training and obtaining a diploma

Awarded degree / qualifications: the Graduate of this educational program is awarded the academic degree "master of technical Sciences" in the direction 7M072 -

Manufacturing and processing industries (Mining engineering).

A graduate who has completed master's programs must have the following General professional competencies:

- the ability to independently acquire, comprehend, structure and use new knowledge and skills in professional activities, develop their innovative abilities;
- the ability to independently formulate research goals, establish a sequence of professional tasks;
- the ability to apply in practice knowledge of fundamental and applied sections of disciplines that determine the direction (profile) of the master's program;
- the ability to professionally select and creatively use modern scientific and technical equipment to solve scientific and practical problems;
- the ability to critically analyze, present, protect, discuss and disseminate the results of their professional activities;
- proficiency in drawing up and processing scientific and technical documentation, scientific reports, reviews, reports and articles;
- readiness to lead the team in the sphere of their professional activities, tolerant of social, ethnic, religious and cultural differences;
- readiness to communicate in oral and written forms in a foreign language to solve the problems of professional activity.

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

research activities:

- the ability to form diagnostic solutions to professional problems by integrating the fundamental sections of science and specialized knowledge obtained during the development of the master's 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 research 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, able to implement their professional knowledge, skills and abilities in public and private management, mining enterprises, nuclear industry in design and research organizations of any form;

– *research and production activities:*

- the ability to independently conduct production and scientific-production field, laboratory and interpretative work in solving practical problems;
- ability to professionally operate modern field and laboratory equipment and devices in the field of master's degree program;
- ability to use modern methods of processing and interpreting complex

information to solve production tasks;

– project activity:

- the ability to independently prepare and submit research and production projects;

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

– *organizational and managerial activities:*

- readiness to use practical skills in organizing and managing research and production activities in solving professional tasks;

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

– 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 program, all General cultural and professional competencies, as well as professional competencies related to the types of professional activities that the master's program focuses on, are included in the set of required results of the master's program.

7 Working curriculum and modular educational program

year of study	Code	Name of course	Component	Credits	lecture/ laboratory/ practice/sis	Prerequisites	Code	Name of course	Component	Credits	lecture/ laboratory/ practice/sis	Prerequisites
	1 semester						2 semester					
1	LNG202	Foreign language (professional)	BD IC	6	0/0/3/3		AAP244	Pedagogical practice	BD IC	4	0/0/2/2	
	MIN283	Subsoil Code and rights regimes in subsoil use	PS IC	6	2/0/1/3		HUM201	History and philosophy of science	BD IC	4	1/0/1/2	
	HUM204	Management psychology	BD IC	4	1/0/1/2		HUM207	Higher school pedagogy	BD IC	4	1/0/1/2	
	MIN258	Innovative methods of drilling and blasting operations	BD OC	6	2/0/1/3		MIN260	Geotechnological processes in the development of mineral deposits	BD OC	6	2/0/1/3	
	MIN278	Technology of integrated development of underground space					MIN280	Process regulations and mining planning				
	MIN268	Digital technology in mining SMART Mine	PS IC	6	1/0/2/3		MIN261	Rational technology of vertical mining	BD OC	6	2/0/1/3	
	AAP242	Master's student scientific research, including an internship and a master's thesis.	MSSR	6			MIN271	Innovative methods of securing mining and underground structures				
							MIN259	Continuous Career Design Methodology	PS IC	6	2/0/1/3	
							AAP242	Master's student scientific research, including an internship and a master's thesis.	MSSR	6		
		In total:		**34**				**In total:**		**36**		
	3 semester						4 semester					
2	MIN273	Design of underground mines	PS OC	6	2/0/1/3		AAP242	Master's student scientific research, including an internship and a master's thesis.	MSSR	6		
	MIN211	Methodology for the construction of underground structures										
	MIN253	Metro Underground Construction Technology	PS OC	6	2/0/1/3		AAP236	Research scientific training	PS	7		
	MIN285	Modernization of the processes of horizontal and inclined mine workings										
	MIN286	Highly safe mining operations in deep quarries	PS OC	6	2/0/1/3		ECA205	Registration and defense of the master's thesis (RaDMT)	FA	12		
	MIN287	Intensification of reclamation of lands disturbed by open-pit mining										
	MIN290	Technology of laying-of the develped space	PS OC	6	2/0/1/3							
	MIN291	Rational technologies for development of placer deposits										
	MIN284	Resource Saving Integrated Mineral Resources	PS OC	6	2/0/1/3							
	MIN294	Methods of coal mining in sections						**In total:**		**25**		
	AAP242	Master's student scientific research, including an internship and a master's thesis.	MSSR	6								
		In total:		**36**								

Decision of the Academic Board of Satbaev University. Protocol No. ___ of "_____" _____ 20___.
Decision of the Academic Board of the Institute of Geology, Oil and mining Protocol No. ___ of "___" _____ 20__.

Number of credits for the whole period of study	
Cycles of disciplines	**Credits**
The cycle of general education	
A cycle of basic disciplines (BD IC, BD OC)	40
A cycle of principal subjects (PS IC, PS OC)	55
All on the theoretical classes:	**95**
MSSR	24
Registration and defense of the master's thesis (RaDMT)	12
In total	131

The cycle	code	Name of disciplines	Semester	Acad. credits	lec.	lab.	prac	IWS	Type of contro	Chair
Profile training module										
Basic disciplines (BD) (40 credits)										
University component (22 credits)										
BD 1.2.1	HUM201	History and philosophy of science	1	4	1	0	1	2	Exam	SD
BD 1.2.2	HUM207	Higher school pedagogy	1	4	1	0	1	2	Exam	SD
BD 1.2.3	LNG202	Foreign language (professional)	2	6	0	0	3	3	Exam	EL
BD 1.2.4	HUM204	Management psychology	2	4	1	0	1	2	Exam	SECPM
Practice-oriented module										
	AAP244	Pedagogical practice	2	4					Report	ME
Choice component (18 credits)										
BD 1.2.5	MIN258	Innovative methods of drilling and blasting operations	1	6	2	0	1	3	Exam	ME
BD 1.2.6	MIN278	Technology of integrated development of underground space								
BD 1.2.7	MIN260	Geotechnological processes in the development of mineral deposits	2	6	2	0	1	3	Exam	ME
BD 1.2.8	MIN280	Process regulations and mining planning								
BD 1.2.9	MIN261	Rational technology of vertical mining	2	6	2	0	1	3	Exam	ME
BD 1.2.10	MIN271	Innovative methods of securing mining and underground structures								
Major disciplines (MD) (55 credits)										
University component (UC)										
MD 1.3.1	MIN283	Subsoil Code and rights regimes in subsoil use	1	6	2	0	1	3	Exam	ME
Choice component (CC)										
MD 1.3.2	MIN268	Digital technology in mining SMART Mine	1	6	1	0	2	3	Exam	ME
MD 1.3.3	MIN259	Continuous Career Design Methodology	2	6	2	0	1	3	Exam	ME
MD 2.3.4	MIN273	Design of underground mines	3	6	2	0	1	3	Exam	ME
MD 2.3.5	MIN211	Methodology for the construction of underground structures								
MD 2.3.6	MIN253	Metro Underground Construction Technology	3	6	2	0	1	3	Exam	ME
MD 2.3.7	MIN285	Modernization of the processes of horizontal and inclined mine workings								
MD	MIN286	Highly safe mining operations in deep	3	6	2	0	1	3	Exam	ME

2.3.8		quarries								
MD 2.3.9	MIN287	Intensification of reclamation of lands disturbed by open-pit mining								
MD 2.3.10	MIN290	Technology of laying-of the develped space	3	6	2	0	1	3	Exam	ME
MD 2.3.11	MIN291	Rational technologies for development of placer deposits								
MD 2.3.12	MIN284	Resource Saving Integrated Mineral Resources	3	6	2	0	1	3	Exam	ME
MD 2.3.13	MIN294	Methods of coal mining in sections								
Practice-oriented module										
	AAP236	Research practice	4	7					Report	ME
Research Module (24 credits)										
MSSR	AAP242	Master's student scientific research	1	6					Report	ME
MSSR	AAP242	Master's student scientific research	2	6					Report	ME
MSSR	AAP242	Master's student scientific research	3	6					Report	ME
MSSR	AAP242	Master's student scientific research	4	6					Report	ME
Module of final attestation (12 credits)										
FA	ECA205	Registration and defense of the master's thesis	4	12					Defense of dissertation	
		Total		**131**						

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

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

Learning outcomes are formulated at the level of the entire master's degree program, as well as at the level of individual modules or academic disciplines.

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

A - knowledge and understanding:

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

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

A3 - perform basic calculations of the main parameters of technological processes in the development of MPI by open and underground methods, well development of uranium deposits, justify their choice.

C - application of knowledge and understanding:

B1 - independent development and promotion of various solutions to mining and technical problems using the obtained theoretical and practical knowledge;

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

B3 – based on basic knowledge, be able to adequately navigate various mining situations.

With the formation of judgments:

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

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

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

D - personal abilities:

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

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

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

activities.

9 Competence at the end of training

9.1 Requirements for the key competencies of graduates of the scientific and pedagogical master's degree, must:

1) have an idea:

– about the role of science and education in public life;

– about current trends in the development of scientific knowledge;

– current methodological and philosophical problems of natural (social, humanitarian, economic) Sciences;

– professional competence of a high school teacher;

– contradictions and socio-economic consequences of globalization processes;

2) know:

- methodology of scientific knowledge;

- principles and structure of scientific activity organization;

- psychology of students ' cognitive activity in the learning process;

- psychological methods and tools to improve the effectiveness and quality of training;

3) be able to:

- use the acquired knowledge for original development and application of ideas in the context of scientific research;

- critically analyze existing concepts, theories and approaches to the analysis of processes and phenomena;

- integrate knowledge gained in different disciplines to solve research problems in new unfamiliar conditions;

– through the integration of knowledge to make judgments and to make decisions based on incomplete or limited information;

- apply the knowledge of pedagogy and psychology of higher education in their teaching activities;

- apply interactive learning methods;

- carry out information-analytical and information-bibliographic work with the use of modern information technologies;

– creative thinking and creative approach to solving new problems and situations;

- be fluent in a foreign language at a professional level that allows you to conduct research and teach special subjects in universities;

- summarize the results of research and analytical work in the form of a dissertation, scientific article, report, analytical note, etc.;

4) have the skills to:

– research activities, solutions to standard scientific problems;

– implementation of educational and pedagogical activities on credit technology of training;

- methods of teaching professional disciplines;

– use of modern information technologies in the educational process;

– professional communication and intercultural communication;

– oratory, correct and logical formalization of their thoughts in oral and written form;

- expanding and deepening the knowledge necessary for everyday professional activities and continuing education in the doctoral program.

5) be competent:

– in the field of research methodology;

– in the field of scientific and scientific-pedagogical activity in higher educational institutions;

– in matters of modern educational technologies;

– in the implementation of scientific projects and research in the professional field;

– in ways to ensure constant updating of knowledge, expansion of professional skills and abilities.

B - Basic knowledge and skills

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

B2 - understanding the essence and significance of the relationship between production processes and their impact on the efficiency of the entire mining industry, allowing rational use of natural resources, waste-free technology and reduce the negative impact on the environment;

B3 - ability to solve standard tasks of mining production using innovative technologies (SMART mine, quarry, etc.).

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

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

P2 - Master issues of basic technological processes at mining enterprises of ferrous and non-ferrous metallurgy, heat and power complex, non-metallic construction materials, nuclear industry, metro construction, depending on the chosen field of training.

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

underground facilities;

P4 - Possess methods of rational and integrated development of the geo-resource potential of the subsurface;

P5 - Master the basic principles of technologies for extraction and primary processing of solid minerals, construction and operation of underground facilities;

P6 - Readiness to carry out technical management of mining and blasting operations in the extraction of solid minerals, construction and operation of underground facilities, directly manage processes at production facilities, including in emergency situations;

P7 - Readiness to demonstrate skills in developing action plans to reduce the anthropogenic impact of production on the environment in the extraction and primary processing of solid minerals, as well as in the construction and operation of underground facilities;

P8 - Use of regulatory documents on safety and industrial sanitation in the design, construction and operation of enterprises for the extraction and primary processing of solid minerals and underground facilities;

P9 - Readiness to participate in the implementation of automated production management systems;

P10 - Possession of methods of geological and industrial assessment of mineral deposits, mining allotments;

P11 - Possession of the legal framework for subsurface use and ensuring environmental and industrial safety of operations in the extraction, primary processing of minerals, construction and operation of underground structures;

P12 – the Ability to develop and bring to the performers outfits and job mining, construction and blasting, to control the quality of works and to ensure the correctness of their performers, schedules of work and future plans, instructions, estimates, applications for materials and equipment to complete the required reporting documents in accordance with established forms;

P13 - Readiness to promptly eliminate violations of production processes, keep primary records of work performed, analyze operational and current production indicators, justify proposals for improving the organization of production;

P14 - Ability to perform marketing research, conduct economic cost analysis for the implementation of technological processes and production in General;

P15 - Readiness to participate in research of objects of professional activity and their structural elements;

P16 – be Able to study and use scientific and technical information in the field of mining, primary processing of solid minerals, construction and operation of underground facilities;

P17 - Readiness to perform scientific and laboratory research, interpret the results, prepare and protect reports;

P18 - Readiness to use technical means of pilot testing of equipment and technologies in the extraction, primary processing of solid minerals, construction and operation of underground facilities;

A19 – the Possession of skills of organization of research works;

P20 - Readiness to develop innovative design solutions for mining, primary processing of solid minerals, construction and operation of underground facilities;

P21 - the Ability to develop the necessary technical and regulatory documentation as part of creative teams and independently, monitor the compliance of projects with the requirements of standards, technical conditions and industrial safety documents, develop, approve and approve in the prescribed manner technical, methodological and other documents regulating the procedure, quality and safety of mining, construction and blasting operations;

P22 - Readiness to demonstrate skills in developing systems to ensure environmental and industrial safety in the production of works on the extraction and processing of solid minerals, construction and operation of underground facilities;

P23 - Readiness to work with software products of General and special purpose for modeling solid mineral deposits, technologies for extraction and primary processing of solid minerals, during construction and operation of underground facilities, assessment of the economic efficiency of mining and construction works, production, technological, organizational and financial risks in market conditions.

P24 - Skills of conducting scientific research, performing laboratory and experimental research with subsequent processing of results using modern computer technologies, improving existing and developing new research methods and techniques, technical and technological solutions and hardware for their implementation, choosing technical means for conducting research.

P25 - Skills to apply modern information technologies, automated production management systems to create SMART mines.

P26 - Ability to analyze and apply the laws on subsoil and subsoil use, industrial safety and the environmental code, regularly monitor changes and additions to these laws;

P27 - a Specialist who develops a game-based training format, cases and quests for interacting with equipment, which provides a warm-up of interest (motivating emotions, social action, progress and remuneration) for the new generation of specialists (Y,Z) to self-development and training in the workplace;

P28 - ability to work with drones the main task of which is to track the quality of various types of work: from blasting in quarries, to the work of equipment and people in quarries, in workshops;

P 29 - the Ability to work with technologies of unmanned vehicles, the main task of which is to lay routes along which the company will move unmanned dump

trucks. The specialist places the points of loading and unloading, refueling, designates the optimal route for them, based on the shape and current state of the quarry;

P 30 - Skill develops and configures software for digital equipment.

O - Universal, social and ethical competences

O1 - ability to abstract thinking, analysis, synthesis;

O2 - the Ability to use the basics of philosophical knowledge to form a worldview;

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

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

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

O6 - Readiness to act in non-standard situations, to bear social and ethical responsibility for the decisions made;

O7 - Readiness for self-development, self-realization, use of creative potential;

O8 - the Ability to use methods and means of physical culture to ensure full-fledged social and professional activities;

O9 - Ability to use first aid techniques, methods of protection in emergency situations;

O10 - ability to create a favorable working environment at the enterprise: recreation areas, food and main production facilities, taking into account the requirements of production efficiency and safety;

C - Special and managerial competencies:

C1 - Ability to solve professional tasks based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security;

C2 - Readiness to communicate in oral and written forms in the state, Russian and foreign languages to solve professional tasks;

C3 - Readiness to lead a team in the sphere of their professional activity, to accept social, ethnic, confessional and cultural differences with tolerance;

C4 - Readiness to evaluate the structure, mineral composition of the earth's crust, morphological features and genetic types of solid mineral deposits from natural science positions when solving problems of rational and comprehensive development of the geo-resource potential of the subsurface;

C5 - Readiness to use scientific laws and methods in the geological and industrial assessment of solid mineral deposits and mining allotments;

C6 - Readiness to use scientific laws and methods in assessing the state of the environment in the field of operation of production facilities for the extraction and processing of solid minerals, as well as in the construction and operation of

underground facilities;

C7 - the Ability to select and (or) develop integrated technological systems for mining and processing of solid minerals, as well as enterprises for the construction and operation of underground facilities with technical means with a high level of control automation;

C8 - Possession of methods of analysis, knowledge of laws of behavior and management of properties of rocks and the state of the array in the processes of extraction and processing of solid minerals, as well as in the construction and operation of underground structures.

9.2 Requirements for research work of a master's student in the scientific and pedagogical master's program:

1) corresponds to the profile of the educational program of the master's degree in which the master's thesis is performed and defended;

2) relevant and contains scientific novelty and practical significance;

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

4) is carried out using modern methods of scientific research;

5) contains research (methodological, practical) sections on the main protected provisions;

6) based on international best practices in the relevant field of knowledge.

9.3 requirements for organizing practices:

The educational program of the scientific and pedagogical master's program includes two types of practices that are conducted in parallel with theoretical training or in a separate period:

1) pedagogical in the DB cycle – at the University;

2) research in the PD cycle - at the place of completion of the dissertation.

Pedagogical practice is conducted in order to form practical skills of teaching and learning methods. At the same time, undergraduates are involved in conducting undergraduate classes at the discretion of the University.

Research practice of a master's student is conducted in order to familiarize with the latest theoretical, methodological and technological achievements of domestic and foreign science, modern methods of research, processing and interpretation of experimental data.

The matrix of competencies of the educational program

Index disciplines	Name Disciplines'	Professional																														Universal, social and ethical issues										Special and managerial								
		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24	P25	P26	P27	P28	P29	P30	O1	O2	O3	O4	O5	O6	O7	O8	O9	O10	C1	C2	C3	C4	C5	C6	C7	C8	C9
Required component																																																	
LNG 205	Foreign language (professional)																															x	x	x	x	x			x											
HUM 201	History of philosophy and science																															x	x	x	x		x			x										
HUM 207	Pedagogy of higher education																																			x	x	x	x	x	x									
HUM 204	Management psychology																																			x	x	x	x	x	x									
MIN 283	The code on subsurface resources and legal regimes in subsurface use																																									x	x	x			x	x	x	x
MIN 268	Digital technologies in mining production SMART Mine																																									x	x	x	x	x			x	x
Elective course																																																	
MIN 278	Technology for integrated development of underground space	x	x	x	x	x	x					x	x	x	x																																			
MIN 259	The methodology of the continuous design of open pits		x					x	x	x	x					x	x	x	x	x	x	x																											
MIN 260	Geotechnological processes in the development of mineral deposits	x	x	x				x	x	x						x	x	x			x	x	x																											
MAP 280	Technological regulations and planning of mining operations	x	x	x				x		x	x	x	x				x	x	x																														
MIN 284	Resource-saving integrated development of subsurface resources	x				x	x					x	x	x	x			x	x	x	x	x				x	x		x	x	x																		
MIN 253	Technology for construction of underground metro facilities	x	x	x	x			x	x	x								x		x	x																												
MIN 285	The modernization processes of carrying out horizontal and inclined					x	x	x	x				x	x	x	x						x	x	x	x	x	x			x	x																		

	mine workings																																																	
MIN 273	Design of underground mines		x	x	x				x			x			x		x																											x	x	x	x		x
MIN 211	Methodology for designing construction of underground structures					x	x	x		x	x								x	x	x	x																												
MIN 287	Intensification of reclamation of lands disturbed by open mining operations											x	x	x	x	x							x	x	x	x		x	x																					
MIN 286	High-rhythm safe mining operati			x	x			x	x	x							x		x	x	x						x	x	x																					
MIN 290	Technology for laying waste spa			x	x	x			x		x			x								x	x	x	x	x				x	x																			
MIN 291	Rational technologies for development of placer deposits	x				x	x	x				x	x	x	x								x	x	x				x	x	x																			
State final attestation																																																		
ECA 203	Preparation and defense of a master's thesis (DMD)																																																	
Additional types of training																																																		
AAP 228	Pedagogical practice																																																	
AAP 226	Research work of a master's student																																																	
AAP 233	Research work of a master's student																																																	

10 Appendix to the ECTS diploma

The application is developed according to the standards of the European Commission, Council of Europe and UNESCO/Sepes. This document serves only for academic recognition and is not an official confirmation of the document of education. It is not valid without a higher education diploma. The purpose of completing the European application is to provide sufficient information about the diploma holder, the qualification they have received, the level of this qualification, the content of the training program, the results, the functional purpose of the qualification, as well as information about the national education system. The application model that will be used for transferring assessments uses the European credit transfer or transfer transfer system (ECTS).

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

11 Brief descriptions of disciplines

Foreign language (professional)
Professional English for Project Managers
CODE – LNG 205
CREDIT – 6 (0/0/3/3)
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.

History and philosophy of science

CODE – HUM 201

CREDIT - 6(1/0/1/2)

PRECONDITION - HUM124

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.

Pedagogy of higher education

CODE – HUM 207

CREDIT - 4(1/0/1/2)

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.

Management psychology

CODE – HUM 204

CREDIT - 4(1/0/1/2)

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.

Innovative methods of drilling and blasting operations

CODE - MIN 258

CREDIT – 6 (2/0/1/3)

PREREQUISITE – MIN1461 the 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.

Technology for integrated development of underground space

CODE – MIN 278

CREDIT – 6 (2/0/1/3)
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.

Methodology for continuous quarry design

CODE – MIN 259

CREDIT – 6 (2/0/1/3)

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.

Methodology of mining science and research methods
CODE - MIN 279
CREDIT – 6 (2/0/1/3)
PRECONDITION –

PURPOSE AND OBJECTIVES OF THE COURSE

Training of specialists for planning research work, including theoretical, experimental and industrial methods of achieving knowledge.

The purpose of the discipline is to study the subject, content and structure of mining science; the specifics of research in mining; methodological bases for evaluating research results and methods for performing theoretical and experimental research.

BRIEF DESCRIPTION OF THE COURSE

Fundamentals of mining science and mining. Classification of science and their interaction. History of mining and mining science. The subject and content of mining science and its structure. Post-industrial future and mining science. Methods for achieving knowledge. Classification of research. The specificity of the research in mining. Experiment. Experimental and industrial work. Methodological bases of economic assessment.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

After completing the course, the student will master the methods of achieving theoretical knowledge; methods of conducting experiments and pilot works; skills of preparing a research work plan.

The master's student must know: the subject, content and structure of mining science, methods for achieving new knowledge, the theoretical basis for planning and conducting theoretical and experimental research.

A master's student should be able to: draw up a research plan based on theoretical knowledge, justify the number of necessary experiments, make an expert assessment of the effectiveness of the results obtained, formulate the goal and objectives of scientific research, and predict the desired result.

Geotechnological processes in the development of mineral deposits

CODE – MIN 260

CREDIT – 6 (2/0/1/3)

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.

Technological regulations and planning of mining operations

CODE – MIN 280

CREDIT – 6 (2/0/1/3)

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.

Digital technologies in mining production SMART Mine
CODE – MIN 268
CREDIT– 6 (1/0/2/3)
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.

Development of mine shaft construction processes

CODE – MIN 281

CREDIT - 6 (1/0/2/3)

PRECONDITION –

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of studying this discipline for undergraduates is to acquire knowledge about the main trends in the field of modern construction of mine shafts, new construction materials, technological solutions, methods and technical support of modern mine construction.

The task of the discipline is to study new technological solutions in the production of various types of work, new ways to organize labor-intensive processes, the main directions for reducing the energy and material intensity of construction production.

BRIEF DESCRIPTION OF THE COURSE

The course examines the main issues of modern technology for the construction of vertical mine workings, as well as work on the deepening of vertical mine shafts. Selection and justification of technological schemes of construction. It also provides methods of technical and economic justification of the choice of sinking schemes, complex of sinking equipment, type of support and

optimization of parameters of the sinking cycle.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Ability to develop technological schemes and a calendar plan for the construction of vertical mine workings, to choose methods, techniques and technology of mining and construction work, focusing on innovative developments; to ensure technological and environmental safety of life; to make the necessary technical documentation. Readiness to carry out technical management of mining and blasting operations during the construction of vertical mine workings.

The master's STUDENT SHOULD KNOW: types of new construction materials, areas of their application, main characteristics, advantages and disadvantages of concrete, areas of their application, ways to reduce the complexity of construction and installation work and features of new organizational forms of work.

The master's STUDENT MUST be ABLE to: use normative and technical literature to obtain the necessary information on the technological processes of construction of mine shafts, apply rational methods of work with the condition of reducing labor and energy intensity, determine the main characteristics of concrete, reinforced concrete and tubing materials, use new organizational forms of work on objects using new types of construction materials.

Systems for fixing workings in the construction of underground structures

CODE – MIN 282

CREDIT - 6 (2/0/1/3)

PRECONDITION –

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of studying the discipline is to give undergraduates the knowledge necessary for creative solutions to the problem of ensuring the stability of mine workings and underground structures for various purposes during the entire service life, as well as mastering the methods and principles of calculating the support of mine workings, and the 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 mining structures on the basis of a comprehensive analysis of geomechanical and mining conditions of construction, and calculation of parameters of underground structures.

BRIEF DESCRIPTION OF THE COURSE

Working conditions of support in mine workings. Mechanism of interaction between the support and the rock mass. Basic requirements for the support. Traditional support structures. Metal supports and inter-frame fences. Solid concrete, precast concrete and reinforced concrete support. Sprinklers and anchors. New support structures. Unified block support. A support that uses the load-bearing capacity of an object-oriented array. Adjustable resistance support. New materials for fastening of mine workings.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE

- Readiness to provide technical guidance in the design of supports for mine workings and underground structures, as well as readiness to work with software products for General and special purposes for modeling geomechanical processes in the array and support;
- Ability to develop the necessary technical and regulatory documentation as part of the creative teams and independently monitor compliance with the projects standards, specifications and other normative documents of industrial safety; to develop, agree and approve in the prescribed manner of the technical, methodological and other documents governing the quality and safety performance of mining and construction works on erection of supports;
- 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, wood and metal (steel) structures for underground buildings and structures.

As a result of studying the discipline, a master's student should know:

- General patterns of deformation and destruction of rocks in 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 must be able to:

- assess the stability of loose mining workings and underground structures, taking into account the technology of excavation of the host rocks;
- select the required shape and dimensions of workings based on the stability condition;
- calculate the structural elements of underground structures for strength, stability and stiffness from the effects of static and dynamic loads.

The code on subsurface use and subsurface use rights regimes

CODE – MIN 283

CREDIT - 6 (2/0/1/3)
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.

Resource-saving integrated development of subsurface resources

CODE – MIN 284
CREDIT - 6 (2/0/1/3)
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.

Technology for construction of underground metro facilities

CODE – MIN 253

CREDIT – 6 (2/0/1/3)

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.

The modernization processes of carrying out horizontal and inclined mine workings

CODE – MIN 285

CREDIT – 6 (2/0/1/3)

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.

Design of underground mines

CODE – MIN 273

CREDIT – 6 (2/0/1/3)

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 designing construction of underground structures

CODE – MIN 211

CREDIT – 6 (2/0/1/3)
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.

High-rhythm safe mining operations on steep sides of deep pits

CODE – MIN 286

CREDIT - 6 (2/0/1/3)

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.

Technology of preparation and bookmark of the developed space

CODE – MIN 290

CREDIT - 6 (2/0/1/3)

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.

Intensification of reclamation of lands disturbed by open mining operations

CODE – MIN 287

CREDIT - 6 (2/0/1/3)

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.

Rational technologies for vertical mine workings
CODE - MIN 261
CREDIT - 6 (1/0/1/2)
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.

TEACHING PRACTICE

AAP244

CREDIT - 4 (0/0/2/2)

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

AAF - 242

CREDIT - 12

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

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

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

PURPOSE AND OBJECTIVES OF THE PRACTICE

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

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

THE TASKS OF R&D ARE:

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

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

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

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

• the ability to practically carry out scientific research, experimental work in a

particular scientific field related to the master's thesis;

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

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

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

• the ability and willingness to process the results obtained, analyze and interpret them, taking into account the available literature data;

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

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

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

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

12 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;

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Рецензия

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

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

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

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

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

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

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

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

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