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MODEL OF A GRADUATE (MASTER'S STUDENT)

of educational program 7M07203 – Mining Engineering

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PREFACE

1 DEVELOPED by Mining department of Mining-metallurgical institute of NJSC Kazakh National Research Technical University after K.I.Satpayev

Chair of Mining department _____ S. Moldabayev
"24" 03 2022.

2 AGREED

Board member – Vice-rector for academic inquiries _____ B. Zhautikov
"31" 03 2022.

Director of the Department of Academic Affairs _____ N. Zhunusbekova
"30" 03 2022.

Dean of Mining-metallurgical institute _____ K. Rysbekov
"29" 03 2022.

Head of assessment and quality department _____ A. Saurnabayeva
"28" 03 2022.

A. head of Legal Support and Public Procurement department _____ T. Abukenov
"25" 03 2022.

A.Head of documentation support and development of the national language department _____ Z. Orakbayeva
"_____" _____ 2022.

3 DISCUSSED and approved by Educational and methodological council of the Mining-metallurgical Institute (protocol №8 from "16" 03 2022.)

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Signature of a person responsible for the translation _____ Sarybayev N.M.

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Introduction

The main idea of the educational program is to implement a continuous process of training a new capable generation of scientific, pedagogical and professional personnel and aimed to transform the new scientific potential of Kazakhstan from raw material to innovative through the mining and the implementation of sustainable trends in the mining industry.

The uniqueness of the EP "Mining Engineering" is determined by the competencies that a master has after completion of education under this program.

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

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

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

1) theoretical education, including the study of cycles of basic and major 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 a scientific and pedagogical master's program

4) final certification.

The content of the EP "Mining Engineering" based on the development of a multi-level system of training, the fundamentality and quality of education, the continuity and succession of education and science, the unity of education, upbringing, research and innovation, aimed at maximum satisfaction of consumer needs, and should ensure:

- obtaining a full and high-quality professional education in the field of mining mineral deposits (MMD), confirmed by the level of knowledge and training, skills and competencies, based on the criteria established by the State General Educational Standard, their assessment, both in content and in volume:
- training of professional and competitive specialists in the field of MMD and creation of new technologies for mining and production management;
- ability to apply knowledge of mathematics, fundamental and technical sciences;
-use of methods for analyzing and evaluating the results of experiments.

The specialist model includes:

competencies conditioned by the development of modern science and technology;

competencies dictated by the requirements of the profession, specialty;

competencies determined by the socio-political system of the country, its spiritual and moral system.

The model of a specialist has historically been embodied in various forms: qualification characteristics and professionalism.

To acquire a set of professional, intercultural, communicative competencies, a graduate must master the knowledge of the totality of general education (GED), basic (BD) and profile (PD) disciplines, both their mandatory component and the component of choice in accordance with the chosen trajectory of education in full, established by the state standard.

The ability to navigate the information flow is important in the modern world: the ability to find and systematize various sources of information according to a certain criterion; use rational methods of obtaining, transforming, systematizing and storing information, updating it in the necessary situations of intellectual and cognitive activity, as well as computer literacy, knowledge of new information and multimedia technologies (e-mail, Internet), the ability to critically evaluate information.

1. Goals and objectives of the educational program 7M07203 - Mining Engineering

Purpose: training of a highly qualified specialist in the field of mining solid minerals, who meets the requirements of modern high-tech production, able to carry out design and production and technological activities in this area at a high technical level, engage in organizational and managerial activities in the public and private sectors, at mining enterprises, in design, educational and research organizations of any form of ownership.

Tasks:

implementation of technical management of mining and blasting, as well as work to ensure the functioning of equipment and technical systems of mining;

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

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

be guided in practical engineering activities by the principles of the integrated use of the georesource potential of the subsoil;

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

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

organize their work and labor relations in a team based on modern methods, management principles, advanced production experience, technical, financial, social and personal factors;

control, analyze and evaluate the actions of subordinates, manage a team of performers, including in emergency situations;

ensure the training and certification of employees in the field of industrial safety;

conduct a feasibility study, comprehensively justify the operational decisions made and implemented, seek opportunities to improve production efficiency, assist in providing the enterprise's divisions with the necessary technical data, regulatory documents, materials, equipment;

carry out work to improve production activities, develop projects and programs for the development of the enterprise (subdivisions of the enterprise);

analyze the processes of mining, mining and construction industries and the complexes of the equipment used as objects of control;

plan and carry out theoretical, experimental and laboratory studies, process the results obtained using modern information technologies;

carry out patent search, study scientific and technical information, domestic and foreign experience on research topics;

develop models of processes, phenomena, evaluate the reliability of the constructed models using modern methods and tools for analyzing information;

draw up reports on research work independently or as part of teams;

carry out certification tests (research) of the quality of the mining enterprise's products, equipment, materials and technological processes used;

develop measures to manage product quality;

use methods for predicting and assessing the level of industrial safety at production facilities, justify and implement effective measures to reduce industrial injuries;

conduct a technical and economic assessment of solid mineral deposits and underground construction facilities, the efficiency of the use of process equipment;

justify the parameters of the mining enterprise;

carry out calculations of technological processes, the productivity of technical means of complex mechanization of work, the throughput of transport systems of mining enterprises, draw up schedules for the organization of work and calendar plans for the development of production;

justify design solutions to ensure industrial and environmental safety, economic efficiency of production facilities for operational exploration, mining and processing of minerals, during the construction and operation of underground facilities;

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

independently draw up projects and passports for mining and drilling and blasting;

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

2 List of qualifications and positions

A master's graduate in the major 7M07203 - "Mining Engineering" is awarded the academic degree of Master of Technical Sciences.

Qualifications and positions are determined in accordance with the "Typical qualification characteristics of the positions of pedagogical workers and personnel equated to them" approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated by July 13, 2009 No. 338 (as amended and supplemented on 06/09/2011)

Graduates of the specialty 7M07203 - "Mining Engineering", regardless of the trajectory of study, can work in the following positions:

- Foreman;
- chief miner;
- deputy head of the section;
- head of the section;
- director of the mine (enterprises);
- Technical Director.

Types of professional activity

A feature of this master's program is the preparation of graduates capable of conducting the following types of professional activities:

- research activities;
- research and production activities;
- project activity;
- scientific and pedagogical activity.

Objects of professional activity

The objects of professional activity of students in the specialty "Mining Engineering" are mining enterprises of ferrous and non-ferrous metallurgy, the fuel and energy complex, the production of non-metallic mining raw materials, industry research and design institutes, laboratories of higher and secondary technical, primary educational institutions.

3 descriptors

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

Learning outcomes are formulated both at the level of the entire educational program of the master's program, and at the level of individual modules or academic discipline.

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

1. demonstrate developing knowledge and awareness of the area of mining under study, based on advanced knowledge of this area, while developing and applying ideas in the context of the study;
2. apply knowledge at a professional level, understanding and abilities to solve problems in a new environment, in a broader interdisciplinary context;
3. collect and interpret information for the formation of conclusions, taking into account social, ethnic and scientific considerations;
4. clearly and unambiguously communicate information, ideas, conclusions, problems and their solution;
5. learn skills necessary to independently continue further education in the field of mining.

4 Competence upon completion

4.1 Requirements for key competencies of graduates of the scientific and pedagogical master's program, they should:

1) have an idea:

about the role of science and education in public life;

about modern trends in the development of scientific knowledge;

about actual methodological and philosophical problems of natural (social, humanitarian, economic) sciences;

about the professional competence of an instructor of a higher education;

about the contradictions and socio-economic consequences of globalization processes;

2) know:

methodology of scientific knowledge;

principles and structure of organization of scientific activity;

psychology of cognitive activity of students in the learning process;

psychological methods and means of improving the efficiency and quality of education;

3) be able to:

use the knowledge for the 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 within different disciplines to solve research problems in new unfamiliar conditions;

by integrating knowledge, make judgments and make decisions based on incomplete or limited information;

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

apply interactive teaching methods;

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

think creatively and be creative in solving new problems and situations;

be fluent in a foreign language at a professional level, which allows conducting scientific research and teaching special disciplines in universities;

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

4) have skills in:

research activities, solving standard scientific problems;

implementation of educational and pedagogical activities on credit technology of education;

methods of teaching professional disciplines;

use of modern information technologies in the educational process;

professional communication and intercultural communication;

oratory, the correct and logical formulation of thoughts in oral and written form;

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

5) be competent:

in the field of scientific 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, skills and abilities

B1 - knowledge of the main methods, methods for mining mineral resources, the main technological processes of mining, opening schemes and systems for mining of mineral resources, as well as complex mechanization of mining operations;

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

B3 - the ability to solve standard mining problems using innovative technologies (SMART mine, open pit mine and etc).

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

P1 - A wide range of theoretical and practical knowledge in the professional field, technology and integrated mechanization of mining and blasting, applied and new methods for the full and integrated development of subsoil, taking into account industrial and environmental safety.

P2 - To master the issues of the main technological processes at the mining enterprises of ferrous and non-ferrous metallurgy, the energy and power complex, non-metallic building materials, the construction of the subway, depending on the chosen direction of training.

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

P4 - Master the methods of rational and integrated development of the georesource potential of the subsoil;

P5 - Master the basic principles of technologies for the 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 - Willingness to demonstrate skills in developing action plans to reduce the technogenic impact of production on the environment during the extraction and primary processing of solid minerals, as well as during 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 - Willingness to take part 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 legislative framework for subsoil use and ensuring environmental and industrial safety of work during the extraction, primary processing of minerals, construction and operation of underground structures;

P12 - The ability to develop and communicate to the contractors orders and tasks for the performance of mining, mining, construction and drilling and blasting, to monitor the quality of work and ensure the correct execution of their performers, draw up work schedules and long-term plans, instructions, estimates, applications for materials and equipment, fill in the necessary reporting documents in accordance with the established forms;

P13 - Willingness to quickly eliminate violations of production processes, keep primary records of work performed, analyze operational and current production indicators, substantiate 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 - Willingness to participate in the 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 - Willingness to perform scientific and laboratory research, interpret the results, draw up and defend reports;

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

P19 - Possession of skills in organizing research work;

P20 - Readiness to develop design innovative solutions for the extraction, 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, control the compliance of projects with the requirements of standards, specifications and industrial safety documents, develop, coordinate and approve in the prescribed manner technical, methodological and other documents regulating the procedure, quality and safety performance of mining, mining and construction and explosive works;

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

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

P24 - Skills in conducting scientific research, performing laboratory and experimental studies with subsequent processing of the 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 scientific and research work.

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

P26 - Ability to analyze and apply in the course of work the laws on subsoil and subsoil use, industrial safety and the environmental code, regularly monitor changes and additions to these laws.

O - Universal, social and ethical competencies

O1 - Ability for abstract thinking, analysis, synthesis;

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

O3 - The ability to analyze the main stages and patterns of the historical development of society in order to form a civic 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, bear social and ethical responsibility for the decisions made;

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

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

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

C - Special and managerial competencies:

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

C2 - Willingness to communicate in oral and written forms in the state, Russian and foreign languages to solve the problems of professional activity;

C3 - Readiness to lead a team in the field of their professional activity, tolerantly perceive social, ethnic, confessional and cultural differences;

C4 - Willingness to assess the structure, mineral composition of the earth's crust, morphological features and genetic types of deposits of solid minerals from a natural science standpoint in solving problems of rational and integrated development of the georesource potential of the subsoil;

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 functioning 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 use a computer as a means of managing and processing information arrays;

C8 - Ability to select and (or) develop the provision of integrated technological systems for the extraction and processing of solid minerals, as well as enterprises for the construction and operation of underground facilities with technical means with a high level of control automation;

C9 - Possession of methods of analysis, knowledge of the patterns of behavior and control of the properties of rocks and the state of the massif in the processes of mining and processing of solid minerals, as well as in the construction and operation of underground structures.

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

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

2) relevant and contains scientific novelty and practical significance;

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

4) is performed using modern methods of scientific research;

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

6) is based on advanced international experience in the relevant field of knowledge.

4.3 Requirements for the practice organization

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

1) pedagogical in the educational cycle - at the university;

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

Pedagogical practice is carried out in order to form practical skills in teaching and learning methods. At the same time, graduates are involved in conducting graduate studies at the discretion of the university.

The research practice of the graduate is carried out in order to familiarize with the latest theoretical, methodological and technological achievements of domestic and foreign science, modern methods of scientific research, processing and interpretation of experimental data.

5 Requirements for completing studies and receiving a diploma

The main criterion for the completion of the educational process for the preparation of masters of technical sciences is mastering by a student of at least 120 credits, of which at least 73 credits of theoretical training, at least 12 credits of teaching and research practice and at least 24 credits of research work.

Awarded degree/qualifications: A graduate of this educational program is awarded the academic degree of "Master of Engineering" in the direction 7M072 - Manufacturing and Processing Industries (Mining Engineering).

A graduate who has mastered the program should 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 for solving professional problems;

the ability to put into practice the knowledge of fundamental and applied sections of the disciplines that determine the direction (profile) of the master's program;

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

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

possession of skills in the preparation and execution of scientific and technical documentation, scientific reports, reviews, reports and articles;

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

readiness for communication in oral and written forms in a foreign language to solve the problems of professional activity.

A graduate who has mastered the master's program must have professional competencies corresponding to the types of professional activities that the master's program is focused 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, summarize and analyze experimental information, draw conclusions, formulate conclusions and recommendations;

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

research and production activities:

the ability to independently conduct production and research and production field, laboratory and interpretation work in solving practical problems;

the ability to professionally operate modern field and laboratory equipment and instruments in the field of the mastered master's program;

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

project activity:

the ability to independently draw up and submit projects for research and development work;

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

organizational and managerial activities:

readiness to use practical skills of organizing and managing research and scientific and production work in solving professional problems;

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

scientific and pedagogical activity:

the 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 general professional competencies, as well as professional competencies related to those types of professional activities that the master's program is focused on, are included in the set of required results for mastering the program.

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