

NJSC "Kazakh National Research Technical University named after K.I. Satpayev"

Institute of metallurgy and industrial engineering
Department of "Metallurgy and mineral processing"

EDUCATIONAL PROGRAM

"METALLURGY AND MINERAL PROCESSING"
(profile direction (1 year))

Master of engineering and technology in the educational program
"7M07217 - Metallurgy and mineral processing"

on the basis of the specialty of the invalidated Classifier of specialties:
"6M073700-Mineral processing"

1st edition


in accordance with the State Educational Standard of Higher Education 2018

Almaty 2020


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The program was drawn up and signed by the parties:

from KazNRTU named after K. Satbayev:

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| <ol style="list-style-type: none"> 1. Head of the Department "MaMP" 2. Director Of the Institute of metallurgy and industrial engineering 3. Chairman of the TG of the departments "MaMP", professor |  <p>Barmenshinova M.B.</p> <p>Elemesov K.K.</p> <p>Baimbetov B.S.</p> |
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from the employer:

- | | |
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| <ol style="list-style-type: none"> 1. Co-Chairman of the Advisory Board of the IMAIE, first Deputy Executive Director of the DLE "AMaME" 2. Chief concentrator of "KAZ Minerals" LLP |  <p>Mukhanov T.M.</p> <p>Dzhetybayeva U.K.</p> |
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Approved at a meeting of the Educational and methodological Council of the Kazakh national research technical University named after K. Satbayev. Protocol No. 4 of 12.01.2020.

Qualification:

- Level 7 of the National qualifications framework:
- 7M072 Manufacturing and processing industries (master's degree)
 - 7M07 Engineering, manufacturing and construction industries

Professional competence:

Solution of organizational and production tasks in the implementation of innovative projects in the field of mineral processing and metallurgy, preparation for the development of plans and programs for the organization of innovative activities at enterprises of mineral processing and metallurgy along the entire chain of the innovation cycle "fundamental research – R&d (R&d) – production of new types of products", knowledge of modern methods and techniques of working with personnel, methods of creating innovative teams, knowledge of modern methods of digital format of mineral enrichment and digital metallurgy.

Brief description of the program:

1 The objectives of the educational program of the profile magistracy in the direction of "Metallurgy and mineral processing" are:

- the formation of personnel for an innovative economy for the enrichment of minerals, covering modern energy-saving technologies, project activities, innovative solutions, entrepreneurship in the high-tech field of mineral processing;
- the formation of skills in design and decision-making, a culture of self-government, organization of communication and coordination of points of view, design and presentation of results, the use of modern software products and technical means, maintenance of the technological process, management of the preparation and loading of equipment, monitoring the condition of equipment and the rational use of raw materials and materials;
- skills of conducting innovative production management in the field of mineral processing;
- the development of personal scientific-metric indicators of the student.

2 Types of professional activity

Graduates of the educational program of the profile magistracy "Metallurgy and Mineral Processing" can carry out the following types of professional activities: design and engineering, production and technological, organizational and management.

A distinctive feature of the Master's program is that the educational program provides knowledge, skills and abilities to use energy-saving and "green" technologies and materials, production and sale of processing products; on the development of regulatory and technical documentation for the mining and processing and mining and metallurgical sectors; for the improvement and preparation of the means of mining and metallurgical production.

Graduates receive knowledge in the development and implementation of processing and metallurgical technologies, the production of innovative metallurgical products, increased consumer properties; graduates have high leadership and organizational qualities; are capable of creating small science-intensive mining and processing businesses.

The mission of the educational program of the Master's program "Metallurgy and mineral processing" on the basis of the specialty M073700 - "Mineral processing" is the formation of students' social and personal qualities and professional competencies that allow graduates to successfully solve production, technological, organizational and managerial, project tasks in the field of beneficiation minerals, and contributing to their sustainable demand in the labor market, as well as compliance with international educational standards; providing enterprises with highly qualified specialists in the field of mineral processing, specializing in the implementation of promising innovative, digital and applied research and development and implementation of modern technological processes that ensure high quality products at minimal cost.

3. *Objects of professional activity.* The objects of professional activity of graduates are concentration factories, enterprises of ferrous and nonferrous metallurgy, chemical, mining, chemical and machine-building industries, design and research organizations, factory laboratories.

Types and subjects of professional activity.

The subjects of professional activity are technological processes of the mining and processing and metallurgical industries, processing of raw materials, equipment for mining and metallurgical production, automatic control systems for processing production and quality control of final products.

Economic activities: mining of metal ores; mining of iron ore; underground mining of iron ore; open pit mining of iron ore; mining of non-ferrous metal ores; mining of uranium and thorium ore; mining of uranium and thorium ore; mining of ores of other non-ferrous metals; extraction and processing of aluminum-containing raw materials; mining and processing of copper ore; mining and processing of lead-zinc ore; mining and processing of nickel-cobalt ores; mining and processing of titanium-magnesium raw materials (ore); extraction and processing of tin ore; mining and beneficiation of antimony-mercury ores; mining of precious metals and rare metal ores; mining of other non-ferrous metal ores.

Education level code - 07 Engineering, manufacturing and construction industries, 7 Engineering sciences and technologies, 7M072 - Manufacturing and manufacturing industries.

PASSPORT OF THE EDUCATIONAL PROGRAM

1 Scope and content of the program

The term of study in the master's program is determined by the amount of acquired academic credits. Upon mastering the established amount of academic credits and achieving the expected learning outcomes for obtaining a master's degree, the master's educational program is considered fully mastered. In the profile master's program there are 70 academic credits with a study period of 1 year.

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

The master's degree in the profile direction implements educational programs of postgraduate education for the training of management personnel with in-depth professional training.

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

- 1) theoretical training, including the study of cycles of basic and major disciplines;
- 2) practical training of undergraduates: various types of practices, scientific or professional internships;
- 3) experimental research work, including the implementation of a master's project - for a specialized master's program;
- 4) final certification.

The content of the educational program includes the following modules: general education, general engineering, engineering and technical and professional modules.

The educational program includes the following stages of training undergraduates: foreign language (professional), management, psychology of management, physical foundations of energy methods of mineral raw materials enrichment, extraction methods of processing productive solutions of uranium production, modern technologies for the enrichment and processing of mineral raw materials and man-made waste; theory and practice of bioleaching of uranium-containing, gold-bearing and polymetallic ores; theory and practice of processing gold-bearing raw materials; theory and practice of processing polymetallic ores. The ability to choose disciplines from the catalog of elective disciplines of Satbayev University.

The objectives of the educational program are:

1. Competence of graduates in design and engineering and technological work in the implementation of projects to improve and optimize concentration and metallurgical processes, increase their productivity and improve the quality of products.
2. Competence of graduates in the implementation of the development and

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implementation of technological processes for the processing of mineral, natural and technogenic raw materials;

3. Competence of graduates in assessing innovation and technological risks when introducing new technologies;

4. Competence of graduates in the digitalization system of the mineral processing and metallurgy industries. Acquisition of competencies in production management at all stages of the product life cycle;

5. Competence in marketing high-tech technologies.

2 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 admitting citizens to a magistracy 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, on a competitive basis, in accordance with the state educational order, free postgraduate education, if they receive education of this level for the first time.

At the "entrance", a master's student must have all the prerequisites necessary for mastering the corresponding educational master's program. The list of required 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.

3 Requirements for completing studies and obtaining a diploma

Awarded degree / qualifications: The graduate of this educational program is awarded the academic degree "Master of Engineering and Technology" in the direction.

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

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

- the ability to independently formulate research goals, establish a sequence for solving professional problems;

- the ability to apply in practice the knowledge of fundamental and applied disciplines that determine the focus (profile) of the master's program;
- the ability to professionally choose and creatively use modern scientific and technical equipment for solving scientific and practical problems;
- the ability to critically analyze, represent, defend, discuss and disseminate the results of their professional activities;
- possession of the skills of compiling and preparing scientific and technical documentation, scientific reports, reviews, reports and articles;
- willingness to lead a team in the field of their professional activities, tolerantly perceiving social, ethnic, confessional and cultural differences;
- readiness for communication in oral and written forms in a foreign language to solve problems of professional activity.

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

- *production activities:*
 - the ability to independently carry out production, laboratory and interpretation work in solving practical problems;
 - the ability to professionally operate modern 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;
- *organizational and management activities:*
 - readiness for the practical use of regulatory documents in the planning and organization of scientific and industrial work;

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 of mastering the master's program.

4 Working curriculum of the educational program

4.1. The term of study is 1 year

WORKING CURRICULUM

Education program "7M07217 - Metallurgy and mineral processing"
 Group of Educational Programs "M118 - Mineral processing"
 enrolment for 2020 - 2021 academic year

Form of study: full-time

Term of study: 1 year

Academic degree: master of engineering and technology

year of study	Code	Name of course	Component	Academic credits	lec/lab/prac/MSIW	Prerequisites	Code	Name of course	Component	Academic credits	lec/lab/prac/MSIW	Prerequisites
1	1 semester						2 semester					
	LNG202	Foreign language (professional)	BD IC	6	0/0/3/3		AAP246	Work placement	BD IC	7		
	MNG274	Management	BD IC	6	2/0/1/3		AAP220	Master's student experimental research work, including internship and master's project implementation	MSER W	13		
	HUM204	Management Psychology	BD IC	4	1/0/1/2		ECA206	Registration and defense of the master's project (RaDMP)	FA	12		
	1201	ELECTIVE	BD OC	4								
	MET708	Modern technologies of enrichment and processing of mineral raw materials and technogenic waste	PS OC	6	2/0/1/3							
	MET266	Theory and practice of bioleaching of uranium-containing, gold-containing and polymetallic ores	PS OC	6	1/1/1/3							
	1202	ELECTIVE	PS OC	6								
		In total		38				In total		32		
							In all		70			

Number of credits for the whole period of study

Cycles of disciplines	Credits
The cycle of general education	0
A cycle of basic disciplines (BD IC, BD OC)	20
A cycle of principal subjects (PS IC, PS OC)	25
All on the theoretical classes:	45
MSERW	13
Registration and defense of the master's project (RaDMP)	12
In total:	70

ELECTIVE SUBJECTS for enrollment for the 2020-2021 academic year
Education program "7M07217 - Metallurgy and mineral processing"
Group of Educational Programs "M118 - Mineral processing"

Form of study: full-time Duration of training: 1 year Academic degree: master of engineering and technology

Elective code	Code of discipline	Name of disciplines	Cycle	lec/lab/pr/IWMS	Prerequisites
1 semester (FALL 2020)					
1201	MET719	Theory and practice of processing uranium-containing ores and concentrates	B	1/1/0/2	
	MET246	Technology for extracting precious metals from resistant polymetallic raw materials		1/0/1/2	
1301	MET263	Modern and promising technologies for processing ore and man-made raw materials	P	2/1/0/3	
	MET260	Testing and control of technological processes of enrichment		2/1/0/3	
Total:				10	

Number of credits on elective subjects for the entire period of study	
Cycles of disciplines	Credit (ECTS)
Cycle of basic disciplines (B)	4
Cycle of major disciplines (P)	6
TOTAL:	10

MODULAR CURRICULUM

Education program "7M07217 - Metallurgy and mineral processing"

Form of study: full

Duration of training: 1 year

Academic degree: Master

The cycle	code	Name of disciplines	Semester	Acad. credits	lec.	lab.	prac	IWS	Type of control	Chair
Profile training module										
Basic disciplines (BD) (20 credits)										
Required component (16 credits)										
BD	LNG202	Foreign language (professional)	1	6	0	0	3	3	Exam	EL
BD	HUM204	Management psychology	1	4	1	0	1	2	Exam	SECPM
BD	MNG274	Management	1	6	2	0	1	3	Exam	SECPM
By choice module (4 credits)										
BD	MET719	Theory and practice of processing uranium-containing ores and concentrates	1	4	1	1	0	2	Exam	M&MP
BD	MET246	Technology for extracting precious metals from resistant polymetallic raw materials			1	0	1	2	Exam	M&MP
Profile studies (PS) (25 credits)										
Required component (12 credits)										
PS	MET708	Modern technologies of enrichment and processing of mineral raw materials and technogenic waste	1	6	2	0	1	3	Exam	M&MP
PS	MET715	Theory and practice of bio-leaching of uranium-containing, gold-containing and polymetallic ores	1	6	1	1	1	3	Exam	M&MP
By choice module (6 credits)										
PS	MET263	Modern and promising technologies for processing ore and man-made raw materials	1	6	2	1	0	3	Exam	M&MP
PS	MET260	Testing and control of technological processes of enrichment	1		2	1	0	3	Exam	M&MP
Practice-oriented module										
	AAP248	Work placement	2	7					Report	M&MP
Research Module (13 credits)										
MSERW	AAP207	Master's student experimental research work	2	13					Report	M&MP
Module of final attestation (12 credits)										
FA	ECA206	Registration and defense of the master's thesis	3	12						M&MP
		Total		70						

5 Descriptors of the level and amount of knowledge, abilities, skills and competencies

The requirements for the level of preparation of a master's student are determined on the basis of the Dublin 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 learning outcomes that characterize the student's abilities:

- 1) demonstrate developing knowledge and understanding in the studied field of metallurgy and mineral processing, based on advanced knowledge of metallurgy and mineral processing, while developing and / or applying ideas in the context of research;
- 2) apply at a professional level their knowledge, understanding and ability to solve problems in a new environment, in a broader interdisciplinary context;
- 3) collect and interpret information to form judgments, taking into account social, ethical and scientific considerations;
- 4) clearly and unambiguously communicate information, ideas, conclusions, problems and solutions, both to specialists and non-specialists;
- 5) the teaching skills necessary for the independent continuation of further education in the studied field of metallurgy and mineral processing.

6 Competencies on completion of training

6.1 Requirements for key competencies of graduates of a *specialized master's* program must:

1) *have an idea:*

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

2) *know:*

- methodology of scientific knowledge;
- the main driving forces behind changes in the structure of the economy;

- features and rules of investment cooperation;
- at least one foreign language at a professional level, allowing for scientific research and practical activities.

3) *be able to:*

- apply scientific methods of cognition in professional activities;
- critically analyze existing concepts, theories and approaches to the study of processes and phenomena;
- integrate the knowledge gained in different disciplines, use it to solve analytical and managerial problems in new unfamiliar conditions;
- conduct a microeconomic analysis of the economic activity of the enterprise and use its results in the management of the enterprise;
- to apply in practice new approaches to the organization of marketing and management;
- make decisions in difficult and non-standard situations in the field of organization and management of economic activities of an enterprise (firm);
- to apply in practice the norms of the legislation of the Republic of Kazakhstan in the field of regulation of economic relations;
- think creatively and be creative in solving new problems and situations;
- to carry out information-analytical and information-bibliographic work with the involvement of modern information technologies;
- to summarize the results of experimental research and analytical work in the form of a master's thesis, article, report, analytical note, etc.

4) *have skills:*

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

5) *be competent:*

- in the field of research methodology in the specialty;
- in the field of contemporary problems of the world economy and the participation of national economies in world economic processes;
- in the organization and management of the enterprise;
- in the implementation of industrial relations with various organizations, including public service bodies;

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

B - Basic knowledge, abilities and skills

B1 - Know the history and philosophy of science, pedagogy and psychology;

B 2 - Ability to independently apply methods and means of knowledge, learning and self-control to acquire new knowledge and skills, including in new areas that are not directly related to the field of activity.

B 3 - To know the state, Russian and one of the most common foreign languages in the industry at a level that ensures human communication.

B4 - To be able to use fundamental general engineering knowledge, the ability to practically use the foundations and methods of mathematics, physics and chemistry in their professional activities.

B5 - Proficiency in professional terminology and the ability to work with educational and scientific materials in the specialty in the original in a foreign language. Ability to be logically correct, reasoned and clearly build oral and written speech.

B6 - General engineering skills.

B7 - Possession of fundamental knowledge of the theory of mineral processing and metallurgical processes;

B8 - Basic knowledge of waste management.

B9 - Possession of modern and promising processing technologies.

B10 - Know and own the main business processes in an industrial enterprise.

P - Professional competencies:

P1 - a wide range of theoretical and practical knowledge in the professional field;

P2 - capable of analyzing technological lines of mineral processing and metallurgical processes.

P3 - ready to carry out installation, commissioning and operation of production systems for mineral processing and metallurgical processes;

P4 - ready to participate in the development and design of new technologies and production lines for mineral processing, production of finished metal-containing products.

P5 - Have the skills of drawing up an apparatus and technological scheme

P6 - Have the skills to carry out technological, heat engineering and energy calculations

P7 - Be able to calculate aerodynamics and hydrodynamics according to the scheme of the apparatus chain

P8 - Be able to calculate and select the main and auxiliary equipment

P9 - Be able to design and select drawings of equipment, buildings and structures

P10 - Be able to develop technological processes for the production and processing of metals and alloys

- P11 - Be able to develop a diagram of the beneficiation and metallurgical processes, substantiate operating parameters and indicators
- P12 - Be able to draw up a business plan for a technological project
- P13 - Be able to develop energy and resource saving technologies in the field of beneficiation
- P14 - Be able to develop measures to protect the environment for mining and processing
- P15 - Be able to conduct a literary search, draw up reports, reviews, conclusions, etc., choose research methods, plan and conduct the necessary experiments, analyze and summarize research results, file patents
- P16 - Mastering the technology of processing the tailings of concentration plants for additional extraction of valuable components and solving environmental problems of the industrial region
- P17 - Ability to use the knowledge, abilities, skills mastered in the preparation process to develop a methodology for conducting research work related to the professional sphere and organize experiments with an analysis of their results
- P18 - To identify issues on the modernization and implementation of new technologies and equipment for the intensification of enrichment processes in order to increase the recovery of valuable components contained in it
- P19 - Possess practical skills in the field of independent organization and management of research work on the topic
- P20 - Ability to apply knowledge, abilities, skills, mastered in the process of training in the educational program of the magistracy.

O - Human, social and ethical competences

- O1 - able to freely use English as a means of business communication, a source of new knowledge in the field of automation or robotization of production processes. I am ready to use English in professional activities in the field of beneficiation and metallurgy;
- O2 - able to fluently speak the Kazakh (Russian) language as a means of business communication, a source of new knowledge in the field of automation or robotization of production processes. I am ready to use the Kazakh (Russian) language in professional activities in the field of beneficiation and metallurgy;
- O3 - know and apply in work and life the basics of applied ethics and ethics of business communication;
- O4 - know and apply the basic concepts of professional ethics;
- O5 - to know and solve the problems of human influence on the environment.

S - Special and managerial competences

- S1 - independent management and control of the processes of labor and educational activity within the framework of the strategy, policy and goals of the

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organization, discussion of problems, reasoning of conclusions and competent handling of information;

S2 - to be a specialist in conducting experimental studies of objects of enrichment of ore raw materials and metallurgy;

S3 - to be an engineer for the development and design of beneficiation and metallurgical workshops, factories, production lines.

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

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

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

3) it is performed using advanced information technologies;

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

6.3 Requirements for organizing practices:

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

Industrial practice in the PD cycle is carried out with the aim of consolidating the theoretical knowledge gained in the learning process, acquiring practical skills, competencies and experience of professional activity in the taught educational program of the magistracy, as well as mastering advanced experience.

7 ECTS Diploma Supplement

The application was developed according to the standards of the European Commission, Council of Europe and UNESCO / CEPES. This document is for academic recognition only and is not an official proof of education. Not valid without a university degree. The purpose of completing the European Annex is to provide sufficient information about the holder of the diploma, the qualification obtained, the level of this qualification, the content of the study 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 to translate grades uses the European Credit Transfer or Transfer System (ECTS).

The European Diploma Supplement provides an opportunity to continue education at foreign universities, as well as to confirm national higher education for foreign employers. When going abroad for professional recognition, additional

legalization of the educational diploma is required. The European Diploma Supplement is completed in English upon individual request and is issued free of charge.

Master, level 7 of the national qualifications framework with the right to occupy the positions of the first heads of institutions, organizations and enterprises (director, chief concentrator) in the mining industry, according to the Sectoral Qualifications Framework "Mining and Metallurgical Industry" dated July 30, 2019 No. 1 of the Association of Legal persons "Republican Association of Mining and Mining and Metallurgical Enterprises".

Foreign language (professional)

CODE - LNG205

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

PREREQUISITE - Academic English, Business English, IELTS 5.0-5.5

PURPOSE AND OBJECTIVES OF THE COURSE

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

SHORT DESCRIPTION OF THE COURSE

The course is aimed at building vocabulary and grammar for effective communication in project management and improving reading, writing, listening and speaking skills at the "Intermediate" level. Students are expected to develop their Business English vocabulary and learn grammar structures that are often used in a management context. The course 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. Master students also need to study independently (MIS). MIS is an independent work of undergraduates under the guidance of a teacher.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Upon successful completion of the course, students are expected to be able to recognize the main message and message as well as specific details while 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 a generally accepted structure with a higher degree of grammatical accuracy and using business words and phrases, speak about various business situations using appropriate business vocabulary and grammatical structures - in pairs and groups discussions, meetings and negotiations.

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Management

CODE - MNG274

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

PREREQUISITE -

PURPOSE AND OBJECTIVES OF THE COURSE

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

SHORT DESCRIPTION OF THE COURSE

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

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Be able to: prepare documents for the initialization phase of a project, such as a feasibility study, project charter, etc.; develop and analyze documents related to the planning of project activities, apply various methods of decision support; promptly monitor the execution of work and track deadlines; select personnel, resolve contradictions between team members; manage risks arising from project implementation.

Knowledge gained during the course: Modern standards in the field of project management and their characteristics; PMI approach to project management; Investment planning; Accounting for project risks; Methods for optimizing the use of available resources; Ways to resolve conflict situations; Analysis of actual indicators for timely adjustment of work progress.

Skills: project management in accordance with modern project management requirements; apply in the process of project management software MS Project.

Psychology of management

CODE - HUM204

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

PREREQUISITE –

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course is aimed at studying the characteristics of the behavior of individuals and groups of people within organizations; determining psychological and social factors influencing the behavior of workers. Also, much attention will be paid to issues of internal and external motivation of people. The main goal of the course is to apply this knowledge to improve the effectiveness of the organization.

SHORT 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 review the origins and development of the theory and practice of organizational behavior, followed by a review of the main roles, skills and functions of management with a focus on management effectiveness, illustrated with real-life examples and case studies.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Upon completion of the course, students will know: the basics of individual and group behavior; basic theories of motivation; basic leadership theories; concepts of communication, management of conflicts and stress in the organization; will be able to define the different roles of leaders in organizations; look at organizations from the point of view of managers; understand how effective management contributes to an effective organization.

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Modern technologies for enrichment and processing of mineral raw materials and man-made waste

CODE - MET708

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

PREREQUISITE - Master's thesis

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the discipline is to study new modern technologies for the enrichment and processing of mineral raw materials and man-made waste. The objectives of studying the discipline are to obtain knowledge by undergraduates in the field of physical and physical and chemical foundations of the technology of processing mineral and technogenic raw materials, as well as the modern equipment used in them, which implements these technologies in production conditions.

SHORT DESCRIPTION OF THE COURSE

Sulfide ore beneficiation schemes. Comprehensive use of raw materials. Sulfide ore flotation modes. Regimes of flotation of oxidized minerals of non-ferrous metal ores. Regimes of flotation of saline minerals and metal oxides. Technology for recovering gold from stale tailings. Cyanide technology for processing flotation tailings. Chloride technologies for processing technogenic raw materials. System analysis of flotation processes.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

After completing the course, the undergraduate must demonstrate the ability to analyze the material covered on the basis of modern dressing and hydrometallurgical technologies used in the enrichment of mineral and technogenic raw materials. The undergraduate must know the physical foundations of the preparatory, basic, and auxiliary processes used in mineral processing; - Know the design features and the principle of the processing equipment; know the designs and working methods of processing equipment. At the end of the course, the undergraduate must be able to: - compare existing and modern technologies for processing mineral and technogenic raw materials; - to calculate the basic diagrams of beneficiation and equipment.

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Special chapters of the theory of flotation processes

CODE - MET266

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

PREREQUISITE - Master's thesis

PURPOSE AND OBJECTIVES OF THE COURSE

To form a system of knowledge about special chapters of the theory of flotation processes.

Teaching undergraduates in the techniques of competent use of technical reference books and equipment catalogs. Application of the acquired knowledge in daily work in production and in the organization of a productive production process in the field of flotation processes.

SHORT DESCRIPTION OF THE COURSE

This course outlines the theoretical foundations of the flotation process. The basic ideas about the flotation method of mineral raw materials concentration, the variety and complexity of physical and chemical processes taking place in the flotation pulp are given. The current state of the most pressing issues in the theory of flotation is described: preparation of minerals for flotation, interphase interactions, the mechanism of action of flotation reagents, kinetics of flotation, etc. The attention is paid to new directions in the field of flotation: froth separation, ionic and column flotation, electroflotation and the use of electrochemical technology. The possibility of solving the flotation problem based on the application of the equations of capillary physics is shown.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Master students will gain knowledge on the theoretical foundations of flotation beneficiation processes. Students will acquire the ability to navigate in a variety of processes and devices used in flotation concentration; perform technological calculations of schemes and select equipment for flotation; be able to use scientific, technical and advertising literature for acquaintance and analysis of new technologies and devices. Will be able to use the acquired skills and knowledge for effective management of flotation processes.

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Physical foundations of energy methods of mineral processing

CODE - MET273

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

PREQUISITE - MET163

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the discipline is to study new modern directions of energy impacts on the processes of ore dressing and technogenic raw materials. The objectives of studying the discipline is to obtain knowledge by undergraduates on the correct assessment of the influence of energy methods of influence on selective disintegration and on technological indicators of enrichment.

SHORT DESCRIPTION OF THE COURSE

Unconventional energetic methods for selective disintegration of finely dispersed mineral complexes of noble metals. The use of the energy of accelerated electrons in the processing of polymetallic ores. Mechanisms of disintegration of mineral complexes under the influence of high-energy electrons and a directed change in the technological properties of refractory ores and beneficiation products. Increasing the contrast of the physicochemical properties of sulfide minerals. Influence of radiation-thermal treatment on the magnetic properties of iron-containing minerals. Electrochemical methods for intensifying the process of opening refractory gold-bearing ores. The use of microwave energy in the processing of mineral raw materials. Weakening of mineral complexes by a powerful electromagnetic microwave field. Application of microwave radiation in the processes of opening and extracting finely disseminated gold in the processing of sulfide ores and middlings. Resonant disintegration of mineral complexes by hyper-shock waves. Pulse electrical technologies in the processes of disintegration of minerals, rocks and ores. Electric impulse methods of destruction of solid rocks and ores. Exposure to powerful nanosecond electromagnetic pulses. Magnetic pulse processing of mineral raw materials. Magnetic-pulse technology for softening ferruginous quartzites.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Upon completion of the course, undergraduates should know: the most promising directions for improving technological processes, using energy methods of influence, methods of experimental determination and forecasting of the fractional composition of mineral raw materials; determination of the influence of electric impulse destruction methods on the softening of mineral complexes of ore.

Upon completion of the course, undergraduates should be able to: on the basis of the theoretical foundations of ore preparation and the results of studies of the physical and chemical properties of raw materials, predetermine the technology for processing rare metal ores.

Upon completion of the course, undergraduates must have the skills: analysis and generalization of published materials, the search for scientifically substantiated ways and fundamentally new methods of selective destruction of mineral associations at the lowest energy consumption, calculation and forecasting of indicators of the enrichment of ore and technogenic raw materials by energy methods of exposure.

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Extraction methods for the processing of productive solutions of uranium production

CODE - MET275

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

PREQUISITE - MET163

PURPOSE AND OBJECTIVES OF THE COURSE

The objectives of teaching the discipline are the acquisition of knowledge by master students in the field of processing of productive solutions and pulps of uranium production by extraction methods. The course aims at acquiring the skills and knowledge by students that allow them to navigate in the technology of underground leaching of uranium, to know the basic mechanisms and technological schemes of uranium extraction, the theoretical foundations of the extraction and sorption of uranium. Students should know the basic conditions for the extraction of uranium, the patterns of changes in the main parameters of technologies, technical and economic indicators, characteristics of the main equipment.

SHORT DESCRIPTION OF THE COURSE

When studying the discipline, students should familiarize themselves with scientific research in the processing of uranium solutions, acquire skills in working with technical literature and writing abstracts, skills in analyzing the laws of the PSV process.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Undergraduates gaining knowledge about the extraction methods for extracting uranium from productive solutions and the hardware design of extraction processes and the ability to apply extraction methods in solving practical problems. As a result of studying the discipline, undergraduates should know the basic laws of extraction processes and understand the equipment that provides extraction methods for processing productive solutions of uranium production

Thickening and dehydration of mineral raw materials

CODE - MET716

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

PREREQUISITE - Master's thesis

PURPOSE AND OBJECTIVES OF THE COURSE

To form a system of knowledge about the technologies of thickening and dehydration of mineral raw materials, necessary for choosing a scheme for preparing a conditioned product suitable for subsequent processing: enrichment - metallurgical processes. Teaching undergraduates in the techniques of competent use of technical reference books and equipment catalogs. Application of the knowledge gained in daily work in production and in the organization of a productive production process in the field of thickening and dehydration of mineral raw materials.

SHORT DESCRIPTION OF THE COURSE

The discipline contains the foundations of the theory and mechanisms of dehydration processes of enrichment products and hydrometallurgy, dehydration processes in the presence of flocculants; introduces in detail the equipment and apparatus used for these processes, the technique of technological calculations of these processes.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Knowledge of the patterns of dehydration and thickening of mineral raw materials, methods for calculating dehydration technological schemes. To set a task and carry out scientific research in solving specific problems in the direction of training using modern equipment and computing facilities; Simulate auxiliary processes occurring in minerals under external influences, which allow changing the properties of mineral raw materials. It is necessary to understand the purpose of auxiliary operations in mineral processing technologies and get acquainted with their hardware design.

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Filtration and drying of processed and enrichment products

CODE - MET717

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

PREREQUISITE - Master's thesis

PURPOSE AND OBJECTIVES OF THE COURSE

To form a master's student's system of knowledge about filtration and drying technologies of enrichment products, solving problem situations when choosing the optimal schemes for processing raw materials, taking into account its features.

SHORT DESCRIPTION OF THE COURSE

The discipline contains the foundations of the theory and mechanisms of dehydration processes of enrichment products and hydrometallurgy, dehydration processes in the presence of flocculants; introduces in detail the equipment and apparatus used for these processes, the technique of technological calculations of these processes.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Knowledge of the patterns of dehydration and thickening of mineral raw materials, methods for calculating technological dehydration schemes, solving technological problems when choosing the optimal schemes for processing mineral raw materials, taking into account its features.

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Experimental research work of a master student

CODE - AAP220

CREDIT - 13

PREREQUISITE -

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the EIRM is to develop the ability to independently perform experimental research work related to the solution of professional tasks necessary in the further professional activities of masters-managers and masters-marketers.

The tasks of the experimental research work of the undergraduate include:

- the development of professional research thinking of undergraduates, the formation of a clear idea of the main professional tasks and ways to solve them;
- the formation of the ability to independently formulate professional tasks, plan experimental research work and perform computational research in solving professional problems using modern research methods and computing tools;
- formation of the ability to competently use modern technologies for collecting information, processing and interpreting the obtained experimental data;
- conducting bibliographic work on the topic of the master's thesis using modern information technologies;
- processing and analysis of the data obtained, comparing the results of our own research with the data available in the literature;
- ensuring the ability to critically approach the results of their own research, readiness for professional self-improvement and the development of creative potential and professional skills.

SHORT DESCRIPTION OF THE COURSE

EIRM helps to systematize, consolidate and expand theoretical knowledge, develop statistical methods in management, master the elements of independent research work.

The results of the experimental research work of the undergraduate are determined on the basis of Dublin descriptors of the corresponding level of education and are expressed through competencies.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Must have an idea of: about current trends in the development of scientific knowledge; about the contradictions and socio-economic consequences of globalization processes; on the organization of strategic enterprise management, innovation management, leadership theories; about the main financial and economic problems of the functioning of enterprises.

Should know: methodology of scientific knowledge; at least one foreign language at a professional level, allowing for scientific research and practical activities.

Must be able to: apply scientific methods of knowledge in professional activities; critically analyze existing concepts, theories and approaches to the study of processes and phenomena; integrate knowledge gained in different disciplines, use it to solve analytical and managerial problems in new unfamiliar conditions; conduct a microeconomic analysis of the economic activity of the enterprise and use its results in the management of the enterprise; apply in practice new approaches to the organization of marketing and management; make decisions in difficult and non-standard situations in the field of organization and management of economic activities of an enterprise (firm); to apply in practice the norms of the legislation of the Republic of Kazakhstan in the field of regulation of economic relations; to think creatively and be creative in solving new problems and situations; carry out information-analytical and information-bibliographic work with the involvement of modern information technologies; to generalize the results of experimental research and analytical work in the

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form of a master's thesis, article, report, analytical note, etc.

Must have skills: solving standard scientific and professional problems; scientific analysis and solution of practical problems in the organization and management of economic activities of organizations and enterprises; research of problems in the field of management and marketing and use the results obtained to improve the methods of enterprise management; expanding and deepening the knowledge necessary for daily professional activities and continuing education in doctoral studies; use of information and computer technologies in the field of professional activity.

Must be competent: in the field of research methodology in the specialty; in the organization and management of the enterprise; in the implementation of industrial relations with various organizations, including public service bodies; in ways to ensure constant updating of knowledge, expansion of professional skills and abilities.

Manufacturing practice

CODE - AAP246

CREDIT - 7

PREREQUISITE -

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the internship is to obtain professional skills and professional experience in accordance with the direction of master's training and specific types of professional activities provided for by the EP of the master's degree. The practice is aimed at consolidating and concretizing the results of theoretical training, the formation of competencies necessary for further professional activity. Practice provides continuity and consistency in the study of theoretical and practical material, provides an integrated approach to the subject of study.

SHORT DESCRIPTION OF THE COURSE

The results of certification in practice are taken into account when summing up the results of the general progress of students. During the period of internship, undergraduates must timely perform all types of work stipulated by the internship program and submit a report on internship. Undergraduates who fail to complete internship programs without a valid excuse are considered academic debt.

The form of control is differentiated credit. The principle of organizing knowledge and competencies for all types of activities is in accordance with the selected types according to the passport of competencies. 10 days before the start of the internship, the head of the master's program provides information to the institute of magistracy about the place of internship for master's students with the attachment of letters of guarantee or an individual assignment form, with signatures and seals.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Industrial practice by type, according to the areas of master's training, corresponds to the field of professional activity of students and is carried out within the framework of the training program chosen by the undergraduates, is based on the knowledge, skills and abilities in the disciplines studied before passing the industrial practice.

Practice options:

- analysis of the activities of the organization, departments and divisions;
- performance of tasks in accordance with the competencies of training masters of the PLO under the guidance of a person responsible for the practice from the enterprise (organization);
- participation in the processing of data on the activities of an enterprise (organization);
- participation in the preparation of reports on the activities of the enterprise (organization), etc.

The content of industrial practice is agreed with the supervisor of the practice, and approved by the supervisor of the master's program.

Registration and defense of a master's thesis (RDMT)

CODE - ECA206

CREDIT - 12

PREREQUISITE -

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the master's thesis is:

demonstration of the level of scientific / research qualifications of a master student, the ability to independently conduct scientific research, test the ability to solve specific scientific and practical problems, knowledge of the most general methods and techniques for their solution.

SHORT DESCRIPTION OF THE COURSE

A master's thesis is a final qualifying scientific work, which is a generalization of the results of an independent study by a master student of one of the urgent problems of a specific specialty of the corresponding branch of science, which has internal unity and reflects the course and results of the development of the chosen topic.

The master's thesis is the result of the research / experimental research work of the master's student, carried out during the entire period of the master's student's training.

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