


NON-COMMERCIAL JOINT STOCK COMPANY  
KARAGANDA TECHNICAL UNIVERSITY NAMED AFTER ABYLKAS SAGINOV

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2023

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2023

APPROVED  
By the decision of the Academic Council  
Minutes No. \_\_\_ dated \_\_\_ 2023  
Member of the Board - Vice-Rector for  
academic issues  
  
A.M. Temerbaeva

**MODULAR EDUCATIONAL PROGRAM**  
**in the direction of preparation M072 "Industrial and manufacturing industries"**  
**7M07206 "Mineral processing"**  
Level: Master  
Academic degree - "Master of Engineering"  
**2 years**

Karaganda 2023

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Modular educational program

### **7M07206 "Mineral processing"**

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## **Introduction**

Modular educational program 7M07206 "Mineral processing" was developed on the basis of the following regulatory documents:

Law of the Republic of Kazakhstan "On Education" dated July 27, 2007 No. 319-III ZRK, with amendments and additions dated March 27, 2023 No. 216-VII.

Model rules for the activities of organizations of higher and (or) postgraduate education (Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595, with amendments and additions dated January 20, 2023 No. 23).

State Compulsory Standards of Higher and Postgraduate Education (GOSO) (Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2, with amendments and additions dated February 20, 2023 No. 66).

Rules for organizing the educational process on credit technology of education in organizations of higher and (or) postgraduate education (Order of the Minister of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152, with amendments and additions dated April 5, 2023 No. 145).

Qualification reference book for positions of managers, specialists and other employees, approved by order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated December 30, 2020 No. 553, with amendments and additions dated August 12, 2022 No. 309.

Atlas of new professions and competencies 3.11.2020 No. 2 of the Ministry of Labor and Social Protection of the Population of the Republic of Kazakhstan.

Professional standards Appendix No. 4 to the order of the Acting Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated December 21, 2022. No. 24.

The industry qualifications framework in the field of chemical production, approved by the protocol of the Meeting of industry commissions on social partnership and regulation of social and labor relations for the mining, metallurgical, chemical, construction and woodworking industries, light industry and mechanical engineering dated August 16, 2016 No. 1.

A modular educational program is a comprehensive document that defines the goals, objectives and results of education, the structure and content of working curricula and programs, methods and methods of their implementation, educational, methodological and resource support for the educational process and criteria for assessing the educational achievements of students.

## **1 Goals Modular educational program**

Application of this Modulareducational programprovides for the achievement of the following goals:

- in practice to implement the democratic principles of managing the educational process, to expand academic freedom and opportunities for higher education institutions;
- to ensure the adaptation of higher education in the specialty and scientific research to the changing needs of society and the achievements of scientific thought;
  - ensure recognition of the level of training of specialists in other countries;
  - to ensure higher mobility of graduates in the changing conditions of the labor market.

## **2 Passport of the Modular Educational Program**

### **2.1 List of qualifications and positions**

A graduate under this Modular Educational Program is awarded the academic degree "Master of Engineering" in EP **7M07206 "Mineral processing"**. Qualifications and positions are determined in accordance with the "Qualification directory of positions of managers, specialists and other employees", approved by order Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated May 21, 2012 No. 201.

### **2.2 Qualification characteristics of the graduate**

#### **2.2.1 Area of professional activity**

The sphere of professional activity of graduates is science, education and research institutes, industrial enterprises, mining and metallurgical complex.

#### **2.2.2 Objects of professional activity**

The objects of professional activity of graduates are enterprises in the mining and metallurgical complex, processing plants forpreparation, processing and rational use of enrichment products; research and design industry institutes; secondary technical educational institutions; defense companies.

#### **2.2.3 Subjects of professional activity**

The subjects of professional activity of the master of technical sciences in the educational program 7M07205 "**Mineral processing**" are: raw materials, enrichment products, preparatory enrichment processes, auxiliary processes and main enrichment processes, technologies for the separation of

minerals in the enrichment of non-ferrous, noble and rare ores, ferrous metals and coals, as well as modern technologies for processing technogenic raw materials and complex processing of poor mineral raw materials are being developed.

#### **2.2.4 Types of professional activity**

"Master of Technical Sciences" according to the educational program 7M07206 "**Mineral processing**" in accordance with fundamental and special training can perform the following types of professional activities:

- organizational and technological;
- production and management;
- design;
- research;
- educational, pedagogical.

Specific activities are determined by the content of educational and professional training developed by universities.

#### **2.2.5 Functions of professional activity:**

The main functions of the professional activities of graduates are:

##### *Organizational and technological activities:*

- organization and implementation of control of raw materials from the standpoint of the possibility of production and enrichment of minerals;
- to evaluate the feedstock in order to be able to develop new technological processes that ensure high quality of the concentrate;
- modernization of technological research, equipment in order to conduct highly efficient technological processes for the enrichment of minerals;

##### *Production and management:*

- organization of work in the conditions of the existing enrichment production;
- conducting technical control;
- technical and economic analysis of production.

##### *Project activity:*

- design and modernization of technological schemes for the processing of ores of non-ferrous, ferrous metals, coal, the choice of technological parameters, the calculation of the choice of equipment;
- development of design estimates that ensure the effectiveness of design solutions;
- analysis and evaluation of alternative options for enrichment of the technological scheme based on the modeling of technological processes.

##### *Research activities:*

- planning and conducting scientific research in the field of mineral processing;
- modeling and optimization of production plants and technological schemes;
- analysis of scientific and technical literature and conducting a patent search.

##### *Educational (pedagogical) activity:*

- familiarization with the methods of mineral processing;
- education of the younger generation in pedagogical and production activities.

#### **2.2.6 Areas of professional activity:**

Professional activity can be realized in the following areas:

- production and management;
- engineering and technical;
- organizational and technological;
- design and technological;
- design;
- organizational and managerial;
- research;
- educational and pedagogical.

### 3. Map of the Modular Educational Program

Module code and name	Code and name of discipline	Cycle/component	form of control	Semester	Volume of loans ECTS	Formed competencies
<i>DB - Cycle of basic disciplines</i>						
<i>VK - University component</i>						
PsiP 1 Module of psycho-pedagogical	HPS 5201, History and philosophy of science, FL (Prof) 5102 Foreign language (professional), PHE 5103 Pedagogy of higher education, MPsi 5104 Management psychology	BD/VK	Exam	1	15	<b>Know:</b> main directions, problems, theories and methods of the philosophy of science; methods of philosophical analysis of the problems of science and other spheres of culture; forms and methods of scientific knowledge; main patterns and trends in the development of world science; the content of modern philosophical discussions on controversial issues of the relationship between science and society; functional and stylistic characteristics of the scientific presentation of the material in the studied foreign language; general scientific terminology and terminological sublanguage of the relevant specialty in a foreign language; basics of business correspondence in the framework of international cooperation; the basis for writing business papers, paperwork, to conduct office work in the state language, lexical and grammatical, spelling norms, the language system of types of documents in the Kazakh language; processes of development of intellectual functions in the course of educational and professional activities; about the professional development of the personality of the teacher and student; psychological aspects of vocational training and education; psychological features of the organization of labor activity of students and teachers; psychology of the personality of a university teacher; psychological foundations of active methods of teaching and educational work at the university; psychology of pedagogical communication; the main patterns of development of the psychological characteristics of the teaching process; principles, methods and forms of organization of education in a higher educational institution; the specifics of the subject; algorithm for developing a methodology for teaching a subject; actual problems of pedagogical science; the essence of the pedagogical activity of a university teacher; the role of subject education in the professional training of a future specialist; the formation of a research culture of the future specialist and methodological ideas about the patterns and principles of studying pedagogical phenomena; the formation of scientific ideas about the categorical and terminological apparatus of pedagogy, approaches, principles development and personality formation; development and education of professionally significant personality traits; formation of ideas about the influence of pedagogical ideas on social life; formation of skills and abilities of psychological and pedagogical analysis of reality, as well as interpersonal and business communication; formation of a meaningful, functional, professionally important system of knowledge; essence of management; goals, objectives, concepts, stages of management;

					<p>modern approaches to management; principles, methods and functions of the management process; types of management: administrative management; strategic management; production management; innovation management; marketing management; personnel management; classification of firms; factors of the internal and external environment of firms; elements of social responsibility and ethics of firms; components of the communication process; interpersonal communications; organizational communications; bases of acceptance of administrative decisions; factors influencing the process of making managerial decisions; models and methods of decision-making; foundations of leadership, effective motivation and conflict resolution.</p> <p><b>Be able to:</b> use the provisions and categories of philosophy to assess and analyze various trends in the development of modern social and humanitarian knowledge; to argue their views on various problems of the philosophy of science and technology; objectively and independently analyze the state of science and apply them in their scientific and professional activities; evaluate and determine their needs for philosophical knowledge necessary for scientific work; freely read, translate original literature in the chosen specialty with subsequent analysis, interpretation and evaluation of the extracted information; explicate in writing (abstract, annotation, summary) scientific information; participate in professional discussions, scientific debates, discussions, conversations; make a presentation of scientific research; study language material keeping business papers in the state language, be able to conclude contracts, know the rules for writing business letters, convey your thoughts in the state language, consolidate the vocabulary in filling out documents used in your profession; apply the methods of psychology in the study of the personality of the student and teacher; take into account socio-psychological factors in educational work with students; develop a methodology for conducting lectures, practical, laboratory and seminar classes in the main disciplines of the curriculum of a higher educational institution; to develop educational, methodological and didactic support for the lesson and academic discipline; distinguish pedagogical facts, phenomena, events from the surrounding reality and describe them in the language of pedagogical science, based on the laws of pedagogical theories, explanations, forecasting and development; design the educational process, based on new concepts of education and upbringing; create a creative and developing environment in the process of education and upbringing; analyze and evaluate the existing enterprise management system; develop a rational enterprise management structure; determine the optimal number and structure of employees of the management apparatus; to make well-founded and competent management decisions in a timely manner; show entrepreneurship in time, control the situation in the markets, take the initiative and actively redistribute the company's resources to the most profitable areas of activity; manage people.</p>
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						<p><b>Have skills:</b> oral communication in the specialty in the form of a monologue, dialogue / polylogue; preparation of written forms of presentation of information material in the specialty; work with lexicographic sources in a foreign language (traditional and on-line); translate texts from Kazakh into Russian and from Russian into Kazakh, improve the knowledge gained in the business Kazakh language in writing, use it in various situations, introduce the features of the types of documents, the tasks assigned to them, their improvement and vocabulary, the correct use of professional terms in conclusion of documents.</p> <p><b>Be competent:</b> ability to navigate in a variety of methodological approaches; the ability to independently formulate and solve complex theoretical and applied problems in a given branch of science; the ability to demonstrate and apply in-depth knowledge in the chosen field, taking into account modern principles of scientific research; possession of the research methodology of the branch of science and their application in research activities; in the use of a foreign language in foreign language communication for professional and academic purposes; in filling out documents in accordance with state standards, as well as writing styles and functions, in conducting business negotiations in the areas of business and scientific production; in the field of psychodiagnostics of personality and student group; development of profiolograms and psychograms of a specialist; psychological counseling for students and teachers; methods of psychological research; psychological support of the pedagogical process; in the design, development and conduct of classes of various types; in the development of didactic and educational-methodical support of the lesson and academic discipline; in conducting various types of classes in basic and major disciplines, in solving the problems of higher pedagogical education and the prospects for its further development; in matters of applying effective university learning technologies, the main types of pedagogical communicative interaction, means and technologies of unsupervised learning; in solving actual psychological and pedagogical problems; in assessing the results achieved; in the organization and management of students' activities; in the formation of a new and improvement of the existing enterprise management structure; in decisions of economic situations; in the effective use of the principles and methods of management; in the field of planning, organization, motivation and control of the enterprise; in determining the effectiveness of production management.</p>
	PP 5105 Pedagogical practice	BD/VK	Exam	2	5	<p><b>Know:</b> a package of applied computer programs used in various fields of chemical technology; about UIRS, general information about the enterprise, its history, management scheme and structure of the enterprise, main and auxiliary workshops and their interaction, chemistry of the main technological process, arrangement and purpose of the main apparatus; about the methods and progress of the analysis of oil, oil raw materials, oil products, petrochemical products in the laboratories of research institutes and central laboratory of oil refining and petrochemical</p>

						<p>enterprises. Production control, wastewater treatment and atmospheric emissions, interconnections of adjacent workshops (installations), process automation, economics, organization and planning of production, safety, labor protection and fire fighting equipment, research and rationalization work.</p> <p><b>Be able to:</b> carry out standard calculations using these programs, issue the results in the form of a practice report; to collect data characterizing production, technical, environmental, ergonomic, socio-economic and other indicators of production, on progressive methods for performing production processes; acquisition of production experience.</p> <p><b>Have skills:</b> work with analytical equipment, instrumentation, with current standards and technical specifications for raw materials and manufactured products; work on technological installations; drawing up reports, filling out diaries, performing basic technological schemes of installations and sketches of devices; work with analytical equipment, instrumentation, with current standards and technical specifications for raw materials and manufactured products in the laboratories of research institutes and central laboratory of oil refining and petrochemical enterprises.</p> <p><b>Be competent:</b> when working with applied computer programs; in assessing the impact of an enterprise's activities on a person and the environment, he knows the essence and social significance of his profession, the main problems of the sciences that determine a specific area of his activity.</p>
<b>KV - Component of choice</b>						
MMOPMRM 2 Module Modern methods of processing mineral raw materials	TOSOMITPOEONFM 5106 Mineral separation technology in the enrichment of non- ferrous metals  // CET 5106 Coal Enrichment technology	BD/CV	Exam	1	5	<p><b>Know:</b> features of the technology for separating minerals depending on the material composition of ores; theoretical bases of methods of beneficiation of non-ferrous metal ores; have knowledge of the choice of technological schemes and modes of mineral processing.</p> <p><b>Be able to:</b> organize the implementation and control of the technology for the separation of minerals during enrichment; develop a technological process for the enrichment of non-ferrous metal ores and coal; as well as technology for obtaining concentrates of non-ferrous metal ores and coal; control the implementation of the main technological operations in the separation of minerals in the process of enrichment of non-ferrous metal ores and coal;</p> <p><b>Have skills:</b> to carry out experimental work on the separation of minerals in the processing of mineral raw materials and coal; make technical, organizational and managerial decisions; when implementing the process of enrichment of non-ferrous metal ores and coal;</p> <p><b>Be competent:</b> in the field of theoretical knowledge of specialized disciplines and practical skills in the field of processing in the separation of minerals to obtain conditioned enrichment products; in instrumentation and equipment of enrichment processes; in the methods of testing the technological scheme of enrichment.</p>

	FODMP 5107 Features of the direction of mineral processing	BD/CV	Exam	1	5	<p><b>Know:</b> features of the direction of enrichment of mineral raw materials and coal, mineralogical and material composition; theoretical bases of methods of enrichment of mineral raw materials; technological schemes and modes of enrichment of mineral raw materials and coal.</p> <p><b>Be able to:</b> to select the technological process of enrichment of mineral raw materials and coals; develop a flotation scheme for obtaining concentrates from mineral raw materials and coal; choose the right reagent regime for flotation of mineral raw materials and coal; carry out research work to improve technological performance in open and closed flotation cycles.</p> <p><b>Have skills:</b> compliance with safety regulations; independent work on educational and special literature; planning and conducting an experiment with the interpretation of the results, solving enrichment problems of a calculated and theoretical nature.</p> <p><b>Be competent:</b> in the development and implementation of advanced technologies in the enrichment of mineral raw materials and coal.</p>
	// FDCE 5107 Features of the direction of coal enrichment					
	TPPORPM 5108 Theory and practice of processing ores of rare and precious metals	BD/CV	Exam	1	5	<p><b>Know:</b> technology for enrichment of ores of rare and noble, ferrous metals, features of the mineral and material composition, requirements for the quality of the finished concentrate.</p> <p><b>Be able to:</b> develop technological processes for the enrichment of rare, noble and ferrous metals; select the technological parameters of the enrichment process; draw up a processing scheme.</p> <p><b>Have skills:</b> compliance with safety regulations; planning and conducting an experiment, analysis of its results, calculation of technological indicators for the enrichment of ores of rare, noble and ferrous metals.</p> <p><b>Be competent:</b> in planning and quality control of ore dressing products; in hardware design and equipment in enrichment processes, the main existing and promising technologies for obtaining conditioned concentrates of rare, noble and ferrous metals.</p>
	// TPFMP 5108 "Theory and practice of ferrous metal ore processing"					
<b>PD - Cycle of major disciplines</b>						
<b>VK - University component</b>						
MTM 3 Module Methods of teaching and management	K (R)L (Prof) 5201 Kazakh (Russian) language (professional)	PD/VC	Exam	2	5	<p><b>Know:</b> scientific vocabulary and scientific constructions of a technical profile; rules for the production of a scientific text and language design; speech norms of the technical sphere of activity; basics of business communication.</p> <p><b>Be able to:</b> generalize and interpret scientific and technical information; use the basic techniques of information processing of oral and written text; choose language means in accordance with the communicative intention and the situation of communication; use etiquette forms of scientific and professional communication; clearly express their point of view on a scientific problem in the Kazakh (Russian) language.</p>

						<p><b>Have skills:</b> production of secondary scientific texts: annotations, theses, summaries, abstracts, reports; independent search for scientific and technical information as the basis of professional activity; free presentation of their thoughts orally and in writing on professionally significant topics; have the skills to prepare messages, reports on professional topics.</p> <p><b>Be competent:</b> in the professional field, to master the language and speech norms of the modern Kazakh (Russian) language.</p>
	MTTD 5202 Methods of teaching technical disciplines	PD/VC	Exam	2	5	<p><b>Know:</b> computer programs used in various fields of mineral processing; enterprises for the processing of ores of non-ferrous, rare, noble, ferrous metals and coal.</p> <p><b>Be able to:</b> carry out calculations on technological indicators of mineral processing, draw up the results of work to assess knowledge in various disciplines related to professional activities.</p> <p><b>Have skills:</b> work with the ChemOffice 7.0 program and the knowledge acquired while studying the courses "Fundamentals of mineral processing", "Processes of ore preparation and equipment", "Flotation methods of enrichment" to prepare students for an in-depth study of special academic disciplines.</p> <p><b>Be competent:</b> in knowledge when working with applied computer programs necessary for the study of disciplines, for use in various fields of mineral processing.</p>
IMMP 4 Module Innovative methods of mineral processing	MTEPTRM 6203 Modern technologies for enrichment and processing of technogenic raw materials	PD/VC	Course work	3	5	<p><b>Know:</b> modern technologies for enrichment and processing, depending on the material composition of technogenic raw materials; theoretical bases of methods of enrichment and processing of technogenic raw materials; technological schemes and the mode of enrichment of technogenic raw materials.</p> <p><b>Be able to:</b> organize the implementation and control of technology for the enrichment of technogenic raw materials; to develop a technology for obtaining concentrates during the processing of technogenic raw materials using the main enrichment processes; carry out experimental work on the separation of minerals in the processing of technogenic raw materials.</p> <p><b>Have skills:</b> V the procedure and methods for testing the technological scheme for the enrichment of technogenic raw materials, processing the results of research on technological indicators.</p> <p><b>Be competent:</b> in choosing a rational scheme for the processing of technogenic raw materials, using the methodology for conducting research work in the apparatus of the main enrichment processes and using their results in practice.</p>
	MEP 5204 Modeling of enrichment processes	PD/VC	Exam	2	6	<p><b>Know:</b> methods of mathematical modeling in relation to the processes of mineral processing; methods of analysis and mathematical description of the fractional composition of mineral raw materials, all separation characteristics of the main concentrating apparatus and enrichment schemes.</p>

						<p><b>Be able to:</b> draw up a regression equation, use the methods of mathematical modeling of experiments to optimize the main parameters and enrichment schemes.</p> <p><b>Have skills:</b> application of statistical planning of experiments, planning of multifactorial experiments by the "steep ascent" method and the simplex method.</p> <p><b>Be competent:</b> in choosing different ways of moving towards the optimal one when planning experiments, applying modeling methods to optimize technological indicators.</p>
	CPOPMMR 6205 Complex processing of poor mineral raw materials	PD/VC	Exam	3	5	<p><b>Know:</b> theoretical foundations in the field of technology for the complex processing of poor mineral raw materials, technological schemes for processing, reagent regime, drawing up a commodity and technological balance.</p> <p><b>Have skills:</b> in processing and complex processing of poor mineral raw materials; characterization of enrichment methods; preparatory processes for the enrichment of poor mineral raw materials: crushing and screening schemes; grinding and classification schemes; gravity enrichment methods; jigging, enrichment in heavy liquids and suspensions; flotation enrichment methods; classification of reagents and their application; classification of flotation machines; in the choice of technology of flotation and magnetic method of enrichment of poor mineral raw materials:</p> <p><b>Be competent:</b> in the formation of knowledge of the general patterns of research on modern enrichment equipment, in the choice of technological equipment, criteria for assessing the quality of products and the effectiveness of the enrichment process.</p>
MMMR 05 Module Modern Methods of Mineral Research	TAFRFM 6206 Technology of application of flotation reagents in the flotation of minerals	PD/VC	Exam	3	5	<p><b>Know:</b> properties and technology. the use of flotation reagents for various purposes in the flotation of minerals.</p> <p><b>Be able to:</b> to study the structure and functions of flotation reagents; analyze the technological aspects of the use of flotation reagents in the flotation of minerals; develop schemes for the use of flotation reagents in the flotation of minerals.</p> <p><b>Have skills:</b> use flotation reagents in the technology of enrichment of ores of non-ferrous, rare, noble, ferrous metals and coal, application of the methodology for calculating the consumption of flotation reagents and the place of their supply to the technological process.</p> <p><b>Be competent:</b> in the field of application of flotation reagents in the enrichment of minerals of all types of ores; the ability to analyze a huge range of reagents and the dynamics of changes in their needs on the market.</p>
	SSMOPI 5207 Standardization, certification and metrology in mineral processing	PD/VC	Exam	2	5	<p><b>Know:</b> normative documents, materials of equipment operation, technical requirements for indicators of raw materials and products, methods of metrological assurance of measurements, standards in the field of OPI.</p> <p><b>Be able to:</b> comply with the documentation requirements in the conditions of the technological process, ensure the operation of the equipment, monitor the updating of regulatory and technical documentation on the indicators of raw materials and manufactured products and use the state standardization system in practice.</p>

						<p><b>Have skills:</b> in the measurement and certification procedure; using modern measuring technologies, which are a sequence of actions aimed at obtaining measuring information of the required quality.</p> <p><b>Be competent:</b> in matters of metrology, standardization and certification in the field of OPI. Draw up technological and technical documentation in accordance with the current regulatory framework based on the use of the basic provisions of metrology, standardization and certification in production activities; apply quality system documentation.</p>
	RP 6208 Research practice	PD/VC	Exam, report	3	12	<p><b>Know:</b> theory, apply it in practice, rationally use the capabilities of modern technology, study and implement modern technologies for mineral processing.</p> <p><b>Be able to:</b> collect and analyze materials for the final qualification work.</p> <p><b>Have skills:</b> practical preparation for independent work as a process engineer, collection of necessary materials on the topic of diploma design, consolidation of acquired theoretical knowledge.</p> <p><b>Be competent:</b> in mastering the practical conditions of the principles of organization and management of production, analysis of economic indicators of production, increasing the competitiveness of products.</p>
	MSIA 6209 Management of scientific and innovative activities	PD/VC	Course work	4	5	<p><b>Know:</b> the main stages of planning scientific and innovative activities, methods for processing and analyzing experimental data of scientific and innovative research, feasibility study of research and development research and scientific and innovative projects, algorithms for writing design solutions for scientific and innovative tasks.</p> <p><b>Be able to:</b> plan scientific and innovative activities, process the experimental data of SDI/EIA, analyze the experimental data of SDI/EIA.</p> <p><b>Have Skills:</b> development of a feasibility study for research and development projects and to study the commercialization of projects, monitoring the stages of scientific and innovative activities, and forming a design solution for a scientific and innovative task.</p> <p><b>Be competent:</b> in matters of preparation and publication of the results of scientific and innovative activities, a feasibility study for research and development / EIA and commercialization of projects, presentation of the results of scientific and innovative activities for public defense.</p>
<b><i>NIRM and final certification</i></b>						
FSW 06 Module Final and scientific work	RWMS 5301 Research work of a master student, including an internship and a master's thesis (RWMS)	IA	Exam, report	2,3,4	24	<p><b>Know:</b> organization of the work of safety and environmental protection services at enterprises, enterprise systems that ensure the safety of equipment and technology for humans and the environment; organization and principle of work of safety and labor protection services, environmental protection, fire, radiation and other types of safety at the enterprise; requirements for the implementation, writing of a thesis (project), execution of an explanatory note and a graphic part;</p>

						<p>key and practically significant provisions on the disciplines of general professional and special training, the procedure for conducting the exam.</p> <p><b>Be able to:</b> to analyze the methods and means of organizing security services at the enterprise, the indicators of their work, production shortcomings and ways to eliminate them, the reserves for improving the efficiency of the safety systems of equipment and technology for humans and the environment; solve tasks independently; give answers that provide an opportunity for an adequate assessment of knowledge and professional training of future specialists.</p> <p><b>Have skills:</b> work with legal documents on safety and environmental protection, communication skills in a work team; design, engineering, technological, cost estimate, reference and regulatory documentation for all safety sections of equipment and technology, statistical reporting forms for safety sections, prescriptions, office work and official correspondence between enterprises and controlling and inspecting services; work with literary sources, reference books, normative and technical documentation in the field of the Belarusian Railways and AIA; use in your answer references to the relevant provisions of educational and scientific literature and show your own point of view.</p> <p><b>Be competent:</b> in the organization and implementation of the work of environmental services and safety; in matters of life safety and environmental protection.</p>
	DDMT 6302 Design and defense of a master's thesis	IA	Defense of a dissertation or passing a comprehensive exam	4	12	<p><b>Know:</b> trends in the development of mineral processing technology, the main scientific and technical problems and development prospects in the field of mineral processing and processing technology, processing, coal and their relationship with related industries; principles of construction of technological schemes for the production of processing waste-free, environmentally friendly technologies; requirements for the implementation, writing of a thesis (project), execution of an explanatory note and a graphic part; key and practically significant provisions on the disciplines of general professional and special training, the procedure for conducting the exam.</p> <p><b>Be able to:</b> collect and analyze materials for writing a final qualification work, conduct research using well-known methods to analyze and carry out the necessary calculations of technological schemes and equipment selection, and use knowledge on theoretical issues in preparation for passing a comprehensive exam.</p> <p><b>Have skills:</b> possession of theoretical foundations in mineral processing; conducting research experiments, the main methods of obtaining and studying minerals in the enrichment of minerals and processing the results of the experiment; possession of methods for safe handling of various flotation reagents. Be competent: in planning and conducting research work, processing their results and assessing errors, mathematical modeling of enrichment processes and phenomena, the principles of constructing technological schemes for processing non-ferrous metal ores and selecting process equipment.</p>

A summary table reflecting the volume of disbursed loans in the context of the modules of the educational program:

Course of Study	Semester	Number of modules being mastered	Number of disciplines studied		Amount of credits							Total hours	Quantity	
			VC	HF	theoretical education	Research practice	Teaching practice	Comprehensive exam	Registration and defense of a master's thesis	Research work of a master student, including the completion of a master's thesis	Total		Exam	Dif. offset (KP, KR)
1	1	3	4	3	thirty						thirty	900	6	
	2		5		21		5			3	thirty	870	4	
2	3	3	4		15	12				3	thirty	900	2	1
	4		1		5			8	18	thirty	930		1	
<b>Total:</b>		<b>6</b>	<b>13</b>	<b>3</b>	<b>87</b>	<b>12</b>	<b>5</b>		<b>8</b>	<b>24</b>	<b>120</b>	<b>3600</b>	<b>12</b>	<b>2</b>



## 1 DEVELOPED

Compiled by:

Omarova N.K. – Candidate of Technical Sciences, Associate Professor of the Department of Chemistry and Chemistry;  
Sherembaeva R.T. and about. Associate Professor of the Department of Chemistry and Chemistry.

## 2 DISCUSSED

2.1 At the meeting of the department X and XT

Protocol dated " \_\_ " \_\_\_\_\_ 2023 No. \_\_\_\_

Head of the Department A.T. Takibaeva

2.2 At the meeting of the FIT Quality Assurance Committee

Protocol dated " \_\_ " \_\_\_\_\_ 2023 No. \_\_\_\_

Chairman \_\_\_\_\_ A.G. Tau