

THE MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF  
KAZAKHSTAN

M.Auezov SOUTH KAZAKHSTAN UNIVERSITY

APPROVED BY  
Chairman of the Board - Rector  
  
d.h.s., Academician  
Kozhamzharova D.P.  
2021y.



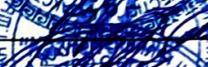
**EDUCATION PROGRAMME**

7M07222 - "Metallurgy"

Registration number	7M07200002
Code and classification of the field of education	7M07 - "Engineering, manufacturing and construction industries"
Code and classification of training areas	7M072 - "Manufacturing and treatment industries"
Group of educational programs	M117 – Metallurgical Engineering
Type of EP	Acting
ISCE level	7
NQF level	7
SQF of education level	7
Language of learning	English
Typical duration of study	2 years
Direction of training	Scientific and pedagogical
The complexity of the EP	120 credits
Distinctive features of EP	-
University Partner ( JEP )	-
University Partner ( TDEP )	-
Social Partner ( DE )	-

Shymkent, 2021

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EP was considered by the Methodological Commission of the Faculty of Metallurgy and Materials Science / Considered by the Committee on Innovative Learning Technologies and Methodological Support \_\_\_\_\_, Protocol № 2 from 22. 2021     .

Chairman of the Committee \_\_\_\_\_  
Aitkulova R.  
Sign

Considered and recommended for approval at the meeting of Educational and Methodical Council of M. Auezov SKU.  
protocol № 5 from 23.02, 2021.

Approved by the decision of the Academic Council of the University  
protocol № 5 from 25.02, 2021.

The educational program was developed with the participation of the partner university - Adam Mickiewicz University in Poznan

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## **Introduction**

### **1. Scope**

Designed for the implementation of Master of technical sciences training by educational program (hereinafter - EP) code "7M07222 – "Metallurgy" in Non-profit Limited Company "M.Auezov South Kazakhstan University" of RK MES.

### **2. Regulatory documents**

Education Act of the Republic of Kazakhstan (as amended and supplemented on 07/04/2018);

Standard rules for the operation of educational organizations implementing educational programs of higher and (or) postgraduate education, approved by order of the Minister of Education and Science of the Republic of Kazakhstan from October 30, 2018 No. 595 (registered with the Ministry of Justice of the Republic of Kazakhstan on October 31, 2018 No. 17657);

State obligatory standards of higher and postgraduate education, approved by order of the Minister of Education and Science of the Republic of Kazakhstan, October 31, 2018 No. 604, with changes by the order of MES RK №182 form the 5th of May, 2020;

The rules for the organization of educational process on credit technology education, approved by order of the Minister of Education and Science of the Republic of Kazakhstan on April 20, 2011 No. 152 as amended and supplemented of October 12, 2018 No. 563

Sectoral qualifications framework "Mining and Metallurgical Industry" (Approved by the protocol of the Session of the sectoral commissions on social partnership and regulation of social and labor relations for the mining and metallurgical, chemical, construction industry and woodworking, of light industry and mechanical engineering from "30" July 2019, No. 1).

Sectoral Qualifications Framework of Education (Approved by protocol of meeting of the branch commission of Ministry of Education and Science of Kazakhstan Republic on social partnership and the regulation of social and labor relations in the field of education and science, dated November 27, 2019 No. 3.

Professional standard "Teacher" (Appendix to the order of the Chairman of the Board of the National Chamber of Entrepreneurs of Kazakhstan "Atameken" No. 133 of June 8, 2017).

### **3. Educational programs concept**

The goal of the educational program is coordinated with the mission of university and is aimed at preparing the intellectual elite of the country with advanced entrepreneurial skills, fluent in three languages, demonstrating conceptual, analytical and logical thinking skills, creative approach in professional activities, being able to work in national and international teams obtaining the lifelong strategy. We are focused on generating new competencies, training a leader who translates research and entrepreneurial thinking and culture.

The educational program is harmonized with the 7th level of the National Qualifications Framework of the Republic of Kazakhstan, with Dublin descriptors, 2 cycle of the Framework for Qualification of the European Higher Education Area, also with Level 7 of the European Qualification Framework for Lifelong Learning.

The educational program is focused on professional and social order through the formation of professional competencies associated with the necessary types of research, practical and business activities, adjusted to meet the requirements of stakeholders.

The uniqueness of EP 7M07222 - "Metallurgy" is that it contains material that differs from the EP undergraduate by new educational information of teacher education in the field of new creative technologies of pedagogy and psychology; in the field of the theory and technology of equipment for metallurgical production at the level of the results described in master's and doctoral theses, monographs,

patents, inventions, reports on grant and target financing. The EP presents a number of original courses in the field of non-ferrous metals and ferroalloys.

The implementation of a flexible EP that takes into account the state of the trend of the metallurgical industry allows us to ensure the quality of educational services in accordance with the qualification requirements.

Program learning outcomes are achieved through the following training events:

- classroom training: lectures, seminars, practical and laboratory classes - held in view of innovative teaching technologies, the use of the latest achievements of science, technology and information systems;
- extracurricular training: the independent work of the student, including under the guidance of a teacher, individual counseling;
- conducting professional practices, implementation of course and diploma works (projects).
- research work of a master student (SRWMS) is independent scientific work of a student, including the implementation of a master's thesis and a scientific internship.

The quality of EP is ensured by the involvement of stakeholders in its development and evaluation, systematic monitoring and review of its content.

#### **4. Entry Requirements**

Established according to the Model Rules for admission to studies in educational organizations that implement educational programs of higher and postgraduate education by order MES RK №600 on 10.31.2018

## **1. EDUCATION PROGRAMME PASSPORT**

### **1.1 The purpose and objectives of education program by specialty**

EP objectives: Training of highly qualified specialists with in-depth scientific and pedagogical knowledges, who are able to plan and perform scientific and educational and production activities in the field of non-ferrous and ferrous metals metallurgy.

EP tasks:

- training of highly qualified specialists for teaching in universities and colleges, as well as research activities in the field of metallurgy;
- providing conditions for the acquisition of high general intellectual level of development, mastering competent and developed speech, culture of thinking and skills of scientific organization of labor in the field of non-ferrous and ferrous metallurgy;
- providing lifelong learning skills and abilities that will enable them to successfully adapt to changing conditions throughout their professional career;
- training of technical managers at various levels of enterprises and organizations engaged in the extraction of metals and the production of commercial products with improved consumer qualities.
- formation of competitiveness of graduates in the field of non-ferrous and ferrous metallurgy, to ensure the possibility of their fastest employment in the specialty or continue their education at the next stages of training.

### **1.2 List of qualifications and positions**

The graduate of this EP is awarded with degree of "Master of technical sciences in education program 7M07222 – "Metallurgy"

Masters by EP 7M07222 – "Metallurgy" can hold primary positions head of the relevant division specialization in the enterprise; technical director, Director on the development, engineer-technologist of metallurgical production, head of the Department of government entity in the metallurgical field, senior researcher in design and survey, research institutes, teacher in higher educational institutions, in (research institutions, design and design organizations) without requirements for work experience in accordance with the qualification requirements of the Qualification directory of positions of managers, specialists and other employees, approved by order of the Minister of Labor and Social Protection of the Republic of Kazakhstan from December 30, 2020 No. 553 and Annex 2 to the Industry qualifications framework "Mining and metallurgical complex", approved from July 30, 2019. (Protocol No. 1).

### **1.3 Qualification characteristics of the educational program graduate**

#### **1.3.1 Scope of professional activity**

The scope of professional activity is the field of non-ferrous and ferrous metallurgy, incl. processes of ore processing with the aim of obtaining concentrates, processes of obtaining metals and alloys, metal products, complex processing of natural, man-made and secondary raw materials.

#### **1.3.2 Objects of professional activity**

The objects of professional activity of graduates are

- higher education institutions
- design and scientific departments,
- mining and metallurgical plants and corporations,
- enterprises of nonferrous and ferrous metallurgy.
- all types of products of the metallurgical industry;
- mineral and industrial raw materials;
- industrial production of cast iron, steel, ferroalloys, non-ferrous and ferrous metals and their alloys;
- industrial plants and technological equipment of metallurgical industries;
- analytical instruments of research laboratories;

- research methodology and analysis methods;
- research and scientific projects;
- design documentation;
- management of primary labor collectives;
- educational and methodical documentation, technical training tools;
- research work.

### 1.3.3 Subjects of professional activity

Subjects of professional activity of the masters by EP 7M07222 – "Metallurgy" in education, scientific and industrial activities are theory and technology of metallurgical processes in the educational process, science and production;

- methods for processing the results of thermodynamic and kinetic studies;
- improvement of technological processes and equipment;
- modernization of existing facilities;
- analysis and solution of problematic production situations;
- design of metallurgical industries;
- management of research projects;
- management of the scientific work of undergraduates and students;
- development of plans for the development of a unit or enterprise;
- patent activity;
- teaching specialized disciplines in metallurgical engineering.

### 1.3.4 Types of professional activity

A master by EP 7M07222 - "Metallurgy" can do the following types of professional activity:

- organizational - managerial;
- production and technology;
- settlement and design; start-up;
- research;
- pedagogical.

## 2. EP learning outcomes

**LO1** Analyzes and summarizes scientific and technical information with the involvement of information resources, applying knowledge of a foreign language; plans and implements complex and interdisciplinary research based on a holistic systemic worldview and knowledge in the field of history and philosophy of science.

**LO2** Applies the knowledge of a higher educational institution of psychology and pedagogy in practical and managerial activities; leads a team of specialists based on entrepreneurial and management skills; plans and carries out scientific and pedagogical work using modern information technologies.

**LO3** Applies the methodology of scientific research in professional activities, incl. of an interdisciplinary nature, for the improvement of pedagogical methods and the development of metallurgical technology.

**LO4** Able to independently analyze the current state of the metallurgical industry, identify its key problems, trends in future development and implement, on this basis, progressive technologies equipped with efficient equipment with a high degree of process automation.

**LO5** Applies advanced methods of scientific and applied research for the prompt solution of current and future research and production problems in the metallurgical industry.

**LO6** Knows how to use the achievements of new results of theoretical and applied metallurgical science, including in the field of mathematical and thermodynamic modeling of processes and the creation of waste-free technologies with the implementation of the global principle of a single technological raw material.

**LO7** Owns algorithms and trajectories for the creation of innovative technologies in the metallurgy of ferrous and non-ferrous metals, providing for theoretical, applied, experimental design work with the commercialization and implementation of the created technologies.

**LO8** Assesses the technical and economic efficiency of metallurgical production from the standpoint of the integrated use of raw materials for the development of innovative technologies and the commercialization of scientific research results.

**LO9** Systematizes and analyzes the results of scientific research, summarizing them in scientific works, patents and reports and testing them at conferences, forums, congresses in the domestic and international scientific environment.

### **3 COMPETENCES OF EP GRADUATE**

**3.1** Successful completion of training in EP contributes to the formation of the following competences of a graduate:

- core competencies (CC)
- professional competencies (PC).

#### ***Core competencies:***

(CC1) in the field of *foreign languages*

- ability to master basic communication skills in a foreign language - understanding, expressing and interpreting concepts, facts and opinions in the professional field, both verbally and in writing (listening, speaking, reading, writing) in the relevant range of social and cultural contexts, mastering skills mediation and intercultural understanding;

(CC2) *computer*

- the ability to confidently and critically use modern information and digital technologies for work, leisure and communications, mastering the skills of using, restoring, evaluating, storing, producing, presenting and exchanging information through a computer, communicating and participating in collaborating networks using the Internet for professional activities;

CC3 *economic, managerial and entrepreneurial*

- the ability to know and understand the goals and methods of state regulation of the economy, the role of the public sector in the economy; master the basics of economic knowledge; possess the skills of critical thinking, interpretation, creativity analysis, drawing conclusions, evaluation; manage projects to achieve professional goals, manage staff, demonstrate entrepreneurial skills.

#### ***Professional competencies:***

PC1 *pedagogical*

- the ability to possess the skills of teaching: lecturing, laboratory and practical classes; use interactive classroom practices; know the types and purpose of educational documentation; own the technology of development of basic educational and methodical documentation; know the procedures of the quality management system in relation to the conduct of training sessions and educational methodological documentation.

PC2 *scientific*

- the ability to carrying out of research and experimental works, to illustrate the expansion and modernization of production, expansion and renewal of the range of the metallurgical industry, the introduction of new technologies; plan and conduct analytical, simulation and experimental studies; be able to handle the results; have skills in writing articles, reports and theses on research work; possess the technology of patent search on the ongoing scientific work and the method of filing an application for an invention; compile reviews, abstracts, draw up scientific and technical reports and have the skill of public speaking with the result of scientific research;

PC3 *engineering*

- ability to analyze the full technological cycle of metallurgical production; apply engineering knowledge to develop and implement projects that meet the specified requirements; own technologies and methods of product quality management; develop proposals for the improvement of technological processes and equipment; to be able, on the basis of a systematic approach, to analyze existing

technological phenomena and predict rational ways of improving the process performance indicators; make professional decisions under conditions of uncertainty and risk.

*PC4 resource saving*

- the ability to assess the basic principles of rational use of natural and man-made resources; analyze the degree of complex processing of raw materials and, on the basis of this, propose a technology for their rational and efficient processing;

*PC5 innovative*

- the ability to apply innovative methods for solving engineering problems; own a method and algorithm for creating innovative technologies, starting from obtaining a protection document for technology with its experimental and industrial verification with subsequent implementation and obtaining a significant economic effect.

**3.2 Matrix of correlation of EP learning outcomes in general with modules formed by competencies**

	LO1	LO2	LO3	LO4	LO5	LO 6	LO7	LO8	LO9
CC1	+								+
CC2			+	+		+	+		
CC3		+		+			+	+	
PC1	+	+	+						
PC2		+	+		+	+	+	+	+
PC3				+			+	+	
PC4				+		+	+	+	
PC5				+	+	+	+	+	+

**4. SUMMARY TABLE REFLECTING THE VOLUME ASSIMILATED CREDITS OF EDUCATION PROGRAM MODULES**

Course of Study	Semester	The number of mastered modules	The number of studied disciplines			Amount of credits KZ					Total hours	Total credits KZ	The number of	
			OC	IC	CCh	Theoretical training	Pedagogical practice	Research practice	Master's research work	Final certification			exam	differen tiated credit
1	1	4		5	2	29			1		900	30	6	2
	2	3			4	23	4		3		900	30	4	2
2	3	2			4	21		7	2		900	30	4	2
	4								18	12	900	30		1
Total				5	10	73	4	7	24	12	3600	120		

### 5. Information about disciplines

Module name	CYCLE	VC /EC	Component Name	Brief course description (in 30-50 words)	Number of credits	Formed LO (codes)
Module of Scientific and Pedagogical Training	BD	VC	History and Philosophy of Science	Considers the history and philosophy of natural and technical sciences, modern European science in culture and civilization, the structure of scientific knowledge, philosophical problems of specific sciences, communication technologies of the XXI century and their role in modern science. Defines the ways to solve modern actual methodological and philosophical problems of natural and technical sciences develops critical thinking and logic.	4	LO1
	BD	VC	Foreign Language (Professional)	Lets develop to develop oral communication skills in a foreign language, intercultural competences, business correspondence exchange skills, master the main types of reading foreign original sources, prepare written messages on scientific topics in the specialty: scientific report, presentation. Discussions, theses and articles on the theme of scientific research in foreign language, annotation of a scientific text, resume writing.	4	LO1 LO9
	BD	VC	Psychology of Management	Considers the methodological problems of the psychological analysis of management processes and phenomena; develops the skills of business and interpersonal communication in conditions of contact between different management cultures; masters the theoretical laws of life and the dynamics of control systems; forms ideas about the methods of management and psychological consulting; critical analysis of the structure of the team and the socio-psychological climate in the team; applies leadership styles in the management of the organization..	4	LO2
	BD	VC	Higher School Pedagogy	Represents modern paradigms of higher education, the system of higher professional education in Kazakhstan. Examines the methodology of	4	LO2 LO3

Module of Methodical Bases of Teaching				pedagogical science, professional competence of a higher school teacher. It allows you to master the credit system of training, new methods and forms of training in the preparation of future specialists, education and the formation of the personality of a specialist with leadership qualities.		
	PD	VC	Teaching Methods of Special Disciplines	Considers information on the implementation of the competence approach in education, technologies of individual, integrated and multimedia learning. Teaches teaching specialized disciplines by analyzing and solving problem situations and cases, methods of improving knowledge, developing experimental skills of students, organizing, planning the educational process in higher education. It allows you to master the methodical features of the study of specialized disciplines of the specialty.	5	LO2 LO3
	BD	VC	Pedagogical Practice	The development of professional research culture in the field of non-ferrous and ferrous metallurgy, as a condition of pedagogical skills and pedagogical creativity, the formation of professional pedagogical skills, culture of scientific and pedagogical thinking. Development of educational and methodical documents. Preparation and conduct of practical and laboratory classes in special disciplines. Development of new active forms of conducting classes with students and their application in practical classes.	4	LO1 LO2 LO3 LO4 LO9
	BD	EC	Innovative Technologies of Processing of Raw Materials Resources of Nonferrous Metallurgy	Reflects information on the integrated processing of raw materials in non-ferrous metallurgy with regard to innovative approaches and their interpretation in relation to monometallic and polymetallic raw materials, taking into account the problems of environmental impact on the environment and atmosphere. Considers alternative options and problem situations in relation to each source of raw materials.		LO6 LO7 LO9

Module of Perspective, Complex Resource-saving Metallurgical Technologies	BD	EC	Modern state of Non-Waste Metallurgical Technologies	At the newest level of knowledge and researches in the fields of non-ferrous and ferrous metallurgy, problems of waste-free technology organization, classification and characterization of waste types in the mining and smelting complex, recycling technology of overburden and enclosing rocks, slags, enrichment tailings, dusts, heavy non-ferrous scrap and waste; the possibility of using waste in related industries is being considered.	5	LO4 LO6 LO8
	PD	EC	Electrothermics of Inorganic Materials	Reflects information on modern promising technologies of electrothermal inorganic materials; considers in depth the issues of thermodynamics, kinetics, mechanism, technology, construction of electrothermal production of yellow phosphorus, calcium carbide, silicon carbide, normal electrocorundum, boron carbide, boron nitride, diamond, as well as new promising processes in electrothermal inorganic materials.		LO5 LO6
	PD	EC	Theoretical Base and Applied Electrometallurgical Technologies	Considers the laws of theory of conversion of electricity into heat and its use in various chemical-technological, metallurgical processes; provides for an in-depth study of the theory of electric heating (resistance of the arc, induction, plasma, dielectric). A graduate acquires calculation skills when conducting electrometallurgical processes; recommends optimal parameters for conducting electrometallurgical processes.	5	LO5 LO6 LO8
			Research practice	Practical study of the latest theoretical, methodological and technological achievements of domestic and foreign science: modern methodology of scientific research; analysis of the state of development of the metallurgical industry and science in the world and Kazakhstan; the role of science and innovation in the improvement and modernization of technology; current trends in the development of the metallurgical industry. Perform theoretical and experimental research on the theme	7	LO1 LO3 LO4 LO5 LO6 LO7 LO9

				of the dissertation.		
	PD	EC	New Technologies for Producing of Ferroalloys from Substandard Zinc-containing Raw Materials	Considers issues of metallurgical production at the junction of ferrous and non-ferrous metallurgy, in particular the complex processing of non-conforming raw materials and ores containing silicon, calcium, zinc, lead; thermodynamic modeling and kinetics, joint coal-thermal reduction of metals from oxide systems and ores; the technology of electric smelting of sub-standard zinc ores in the ore-smelting furnace with the extraction of silicon and iron into ferroalloy.	6	LO4 LO6 LO8
	PD	EC	Promising Technologies for Producing Ferroalloys from Copper-containing Ores	Considers the current state of the processing of copper oxide-containing ores and tailings; issues of the theory and technology of the ferrous metal chloride sublimation from ores and tailings with the preparation of copper-containing concentrate and calcine that does not contain non-ferrous metals, as well as in-depth thermodynamics and recovery kinetics of silicon and iron from the calcine with the production of silicon ferroalloy or master alloys.		LO4 LO6 LO8
	PD	EC	Roasting of Ores and Concentrates	The issues of thermodynamics, kinetics, mechanisms, technologies and equipment of various types are studied in depth, as well as various types of polymerization, as well as promising technologies for complex processing of polymetallic raw materials using chloride sublimation parameters. Allows acquiring skills in calculating computational processes.	6	LO4 LO6
	PD	EC	Reducing Roasting of Iron Ore Materials	The issues of thermodynamics, kinetics, mechanism, technology and equipment of the restorative roasting process in relation to iron-containing, nickel-containing ores, high-silicon bauxite, production of spongy iron, and metallized pellets are studied in depth. The master student acquires the skills of calculating the reduction processes of iron ore materials using computer programs; recommends optimal firing parameters		LO4 LO6

Module Modern High and Medium Temperature Processes in Metallurgy				for various iron-containing raw materials.		
	PD	EC	Plasma processes	Considers the study of physical and chemical processes occurring in arc plasma discharges; the classification of plasma metallurgical and chemical-technological processes with consideration of the technology of decomposition, reduction, oxidation, halogenation of non-ferrous metals and the use of plasma in the steel and iron metallurgy, and the processing of metallurgical wastes. Allows acquiring skills in calculating the effectiveness of plasma processes using computer programs.	6	LO4 LO5 LO8
	PD	EC	Pyroselection	Considers information on theoretical aspects (thermodynamics, kinetics) and technologies of pyroselection of ores, concentrates, metals, alloys, wastes and middling metallurgy products based on the evaporation of substances under normal and reduced pressure, as well as on the basic equipment intended for the pyroselection of the organization of melts and bulk materials. Allows acquiring skills in calculating pyroselection using computer programs.		LO5 LO6
	PD	EC	Technologies for the Production of Refractory Materials	Reflects information about raw materials and about modern technological processes for obtaining refractory materials and products from them; in-depth examines the issues of materials of higher refractoriness, heat-insulating materials and products, fibrous and woven products, as well as the design of furnaces for the production of various refractories. Allows you to acquire the skills of technological calculations for the production and cost of refractory materials.	6	LO4 LO8
PD	EC	Automated Control of Technological Processes in Metallurgy	Considers information about the basic principles of building automated control systems; the methodology of structural stochastic synthesis of noise-resistant systems of various hierarchical levels of management, ways to implement optimal solutions; issues of organizational, informational, mathematical, software and technical support of	LO4 LO6		

				automated control systems; features of automation of agglomeration, blast furnace, steelmaking, as well as furnaces for the production of non-ferrous metals and ferroalloys.		
			Research work of a Master's Student, Including Passing an Internship and Completing a Master's Thesis	Forms research competencies in order to prepare for solving theoretical and applied problems: - search, collection, processing, analysis and systematization of information on the research topic; - development of research methods and tools; - research and analysis of the results, conclusions on the work; - writing articles, reports, preparation of the invention; - self-writing thesis.	24	LO1 LO4 LO5 LO6 LO7 LO9
	BD	EC	Energy-saving Autogenous Processes in Non-ferrous Metallurgy	At the newest level of knowledge and research in the field of non-ferrous metallurgy reflects information about modern promising technologies of energy-saving autogenous processes; provides for an in-depth study of the theory (thermodynamics, kinetics, mechanism), technologies and equipment for the deep oxidation of non-ferrous metals, the method of oxygen-flare smelting, KIVCET-process, PV process, autogenous shaft smelting and autogenous smelting in converters.	5	LO4 LO5
	BD	EC	Combinated and Combined Processes of Ferrous Metallurgy	Studies methods for improving out-of-furnace processing of steel, in particular, combination technology, several simple methods of after-treatment of steel or the creation of new aggregates, complex steel processing (AKOS), and the transformation of simple methods into complex ones. On the example of the processes of the ladle-furnace (Arc-Process), ladle-furnace of direct current, improvements in circulating vacuum, process Ladle-Furnage.		LO4 LO6
	BD	EC	Computer Modeling of	Considers information about the technology of		LO5

	PD	EC	Methods of Chemical Sublimation in Metallurgy	The questions of thermodynamics, kinetics, mechanism, physical phenomena and technology of the sublimation of nonferrous metals processes in the elemental state and in the form of volatile compounds of nonferrous metals are studied in depth; Presents advanced technological experience of methods of sublimation in metallurgy, in relation to the production of inorganic chlorides, fluorides, metal carbonyls and chemical-metallurgical enrichment of polymetallic raw materials.		LO4 LO6
	PD	EC	Chloride Technology of Processing Polymetallic Raw Materials	Considers issues of the modern state of processing of raw materials that are difficult to enrich; thermodynamic modeling and kinetics of extraction of non-ferrous metals by the method of chloride sublimation from refractory ores, tailings; technology of chloride firing in KS furnaces, tubular rotary kilns to produce calcine; theory, the technology of obtaining silicon-containing ferroalloys from the butts. Allows acquiring skills in calculating chloride sublimation firing using computer programs.	5	LO4 LO5 LO8
Module of Final Attestation			Execution and Defense of Master's Thesis	The final qualification work of the graduate of the master's program, confirming the competences acquired in the process of training in accordance with the chosen educational program. Defense of the master's thesis at an open meeting of the State Certification Commission with the participation of the chairman of the commission and at least half of its composition. The procedure and regulations for the protection of a master's thesis are established by the chairman.	12	LO4 LO5 LO6 LO7 LO8 LO9
<b>Total</b>					<b>120</b>	

## APPROVAL SHEET

by Education Program code 7M07222 - «Metallurgy»

Director DAA/ IPE

  
\_\_\_\_\_

Konarbaeva Z.K.

signature

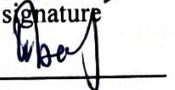
Director SRM

  
\_\_\_\_\_

Nazarbek U. B.

signature

Director DS and Production

  
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Bazhirov T.C.

signature

## РЕЦЕНЗИЯ

на образовательную программу 7М07222 - «Металлургия» по направлению подготовки «7М072 – Производственные и обрабатывающие отрасли», группы образовательных программ «М117 – Metallургическая инженерия»

Образовательная программа 7М07222 - «Металлургия» разработана выпускающей кафедрой «Металлургия» Южно-Казахстанского университета им. М.Ауэзова и предназначена для обучения магистров по направлению подготовки - научно-педагогическое на 2021-2022 учебный год, в соответствии с ГОСО высшего и послевузовского образования 2020 года.

Общая характеристика образовательной программы содержит следующую информацию: цель и задачи, результаты обучения ОП, квалификация выпускника, форма и срок обучения, дана краткая характеристика направления и характеристика деятельности выпускников; приведен перечень ключевых и профессиональных компетенций, которыми должен обладать выпускник в результате освоения образовательной программы, а также область профессиональной деятельности выпускника, объекты профессиональной деятельности выпускника, виды профессиональной деятельности, к которым преимущественно готовится выпускник, перечень профессиональных задач, которые должен быть готов решать выпускник в соответствии с видом (видами) профессиональной деятельности.

Структура программы отражена в рабочем учебном плане и включает учебные циклы: «Цикл базовых дисциплин», «Цикл профилирующих дисциплин», «Научно-исследовательская работа магистранта, включая прохождение стажировки и выполнение магистерской диссертации», «Оформление и защита магистерской диссертации». В образовательной программе общая трудоемкость составляет 120 кредитов (KZ).

Дисциплины учебного плана по рецензируемой образовательной программе формируют весь необходимый перечень общих и профессиональных компетенций, предусмотренных в профессиональном стандарте. Качество содержательной составляющей учебного плана не вызывает сомнений. Включенные в план дисциплины раскрывают сущность актуальных на сегодняшний день проблем, таких как современное состояние безотходных металлургических технологий, новые технологии получения ферросплавов из некондиционного цинксодержащего сырья. Структура плана в целом логична и последовательна.

Разработанная образовательная программа предусматривает профессионально-практическую подготовку обучающихся в виде практики, а именно:

- Педагогическая практика - 4 кредита во 2 семестре;
- Исследовательская практика - 7 кредитов в 3 семестре;

В качестве сильных сторон программы следует отметить, что к ее реализации привлекаются представители производств. Одним из преимуществ является учет требований работодателей при формировании дисциплин профессионального цикла.

Уникальность образовательной программы заключается в том, что она содержит материал, отличающийся от ОП бакалавриата новой информацией педагогического образования в области новых креативных технологий педагогики и психологии; в области теории и технологии оборудования металлургического производства на уровне результатов описанных в магистерских и докторских диссертациях, монографиях, патентах, изобретениях, отчетов по грантовому и целевому финансированию. В ОП представлены ряд авторских курсов в области получения цветных металлов и ферросплавов.

В целом, рецензируемая образовательная программа 7M07222 - «Металлургия», разработанная и реализуемая Южно-Казахстанского университета им. М.Ауэзова, отвечает основным требованиям ГОСО РК и профессионального стандарта, и способствует формированию ключевых и профессиональных компетенций в рамках 7 уровня национальной рамки квалификации по направлению подготовки «7M072 – Производственные и обрабатывающие отрасли» и рекомендуется к утверждению.

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Айткулов Д.К.

**ЭКСПЕРТНОЕ ЗАКЛЮЧЕНИЕ**  
**на образовательную программу 7M07222 – «Металлургия»**  
**(группа образовательных программ - M117 – Metallургическая инженерия)**  
**по направлению подготовки: научно-педагогическое**  
**ЮКУ им.М.Ауэзова**

В настоящее время подготовка востребованных, конкурентоспособных кадров для металлургической отрасли Республики Казахстан в ЮКУ им.М.Ауэзова осуществляется в соответствии с потребностями рынка труда и ориентирована на приобретение обучающимися профессиональных компетенций, установленных с учетом перспективного развития металлургической отрасли. В значительной степени реализация программы ориентирована на обеспечение научно-педагогическими кадрами собственных нужд кафедры «Металлургия» как для ведения учебного процесса, так и для проведения научных исследований в рамках, финансируемых по линии МОН РК научных проектов. Материально-техническая оснащенность и современные образовательные технологии ЮКУ им.М.Ауэзова позволяют удовлетворять повышенные требования к подготовке кадров.

Реализация образовательной программы «Металлургия» и стратегия ее развития осуществляется кафедрой «Металлургия» ЮКУ им.М.Ауэзова в соответствии с заявленной целью и задачами, а также стратегическим планом развития университета.

Образовательная программа 7M07222 – «Металлургия» разработана профессиональным профессорско-преподавательским коллективом кафедры «Металлургия», имеющим высокий научный потенциал с привлечением работодателей и обучающихся магистрантов.

ОП обеспечивают углубленную подготовку магистрантов в области металлургии цветных и черных металлов.

Срок обучения магистрантов по образовательной программе научно-педагогического направления составляет 2 года объемом 120 кредитов.

Цель образовательной программы 7M07222 – «Металлургия» формируется с учетом развития экономики и потребностей рынка труда г.Шымкента, Туркестанской области и страны в целом.

Для достижения запланированных целей в образовательной программе запланировано изучение специальных дисциплин в сочетании с научно-исследовательской работой, педагогической и исследовательской практикой и выполнением выпускной диссертационной работы.

В соответствии со структурой образовательной программы «Металлургия» предусмотрено прохождение обучающимися двух видов практик по научно-педагогическому направлению подготовки:

4 KZ кредита – педагогическая практика,

7 KZ кредитов – исследовательская практика.

Структура образовательной программы магистратуры формируется из различных видов учебной работы, определяющих содержание образования, отражает их соотношение, измерение и учет.

Обязательная часть научной и педагогической образовательной программы направлена на формирование у магистрантов знаний и умений в области планирования и выполнения научно-педагогической деятельности, анализе научных и прикладных результатов, а также знания основных тенденций развития теории и технологии металлургических производств, с умением разработки стратегии и тактики решения научно-педагогических и производственных задач.

В ОП раскрыты содержание, умения, навыки, компетенции магистрантов на конечном этапе обучения. В ОП полностью описаны паспорт, результаты обучения, компетенции выпускника, объем освоенных кредитов в казахстанских KZ, сведения о дисциплинах. В паспорте ОП раскрыты цель и задачи, перечень квалификаций и

должностей, а также показана квалификационная характеристика выпускника. При формировании вариативной части программы в целях конкретизации и дополнения набора компетенций выпускника, были учтены особенности рынка труда, запросы работодателей, мнения ведущих специалистов металлургической отрасли Казахстана.

Квалификации, получаемые в результате освоения программы, подробно и четко разъясняются магистрантам и относятся к соответствующему уровню Национальных рамок квалификаций.

На основании проведенной экспертизы можно сделать заключение - образовательная программа 7M07222 - «Металлургия» разработана с учетом предложений работодателей, обучающихся, и соответствует предъявляемым требованиям.

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