MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN
RSE with EMR "M.AUEZOV SOUTH KAZAKHSTAN STATE UNIVERSITY" MES RK

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UNIVERSITY
1943

EDUCATIONAL PROGRAM

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THE MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN

M.Auezov SOUTH KAZAKHSTAN STATE UNIVERSITY

« APPROVED BY
The Rector
d.h.s., academician Kozhamzharova D.P.
«28» 02 2020 г.

EDUCATION PROGRAMME

7M07513 – Metrology

Registration number	- 7M07500041
Code and classification of the field of education	7M07-Engineering, manufacturing and construction industries
Code and classification of training areas	7M075-Standardization, Certification and Metrology (by industry)
Group of educational programs	7M07513-Metrology
Type of EP	Current EP
ISCE level	7
NQF level	7
SQF of education level	7
Language of learning	English
Typical duration of study	2 years
Form of study	Scientific and pedagogical
The complexity of the EP, not less	120 credits
Distinctive features of EP	-
University Partner (JEP)	-
University Partner (TDEP)	-
Social Partner (DE)	-

Shymkent, 2020

Drafters:

Name	Position	Sign
Tulekbaeva A.K.	k.t.s., associate professor, head of depart	
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Eskaraev B.A.	Head of Technical Regulation and M Department for the city of Shymkent	

EP was considered by the Methodological Commission of the Faculty «Mechanics and Oil and Gas», Protocol № 6 from 17 01 2020.

Chairman of MC (Committee) _____ Dosmakhanbetova A.A.
Sign

Considered and recommended for approval at the meeting of Educational and Methodical Council of M. Auezov SKSU.
protocol № 4 from 26 02 2020.

Approved by the decision of the Academic Council of the University
protocol № 10 from 28 02 2020.

CONTENT

Introduction

1. Scope

Designed for the implementation of masters training by educational program (hereinafter - EP) code 7M07513-Metrology in RSE on right of economic management "M.Auezov South Kazakhstan State 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;

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

Industry qualifications framework "Engineering, manufacturing and construction industries» (On approval of the Classifier of training areas with higher and postgraduate education Order of the Minister of Education and Science of the Republic of Kazakhstan of October 13, 2018 No. 569. Registered in the Ministry of Justice of the Republic of Kazakhstan on October 17, 2018 No. 17565 .)

Industry qualifications framework "Engineering, manufacturing and construction industries» (About the approval of the Classifier of the directions of training with the higher and postgraduate education the Order of the Minister of education and science of the Republic of Kazakhstan of October 13, 2018 No. 569. Registered in the Ministry of justice of the Republic of Kazakhstan on October 17, 2018 No.17565.*);*

Professional standard "Teacher" (Annex to the order of the Chairman of the National chamber of entrepreneurs of Kazakhstan "Atameken" №133 dated June 8, 2017).

Professional standard "Metrology" (Appendix 1 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated 10.22.2018 №283);

Professional standard " ensuring the uniformity of measurements "(Appendix 3 to the order of the Deputy Chairman of the Board of the National chamber of entrepreneurs of the Republic of Kazakhstan "Atameken" dated 30.12.2019 №270)

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.

The educational program is harmonized with the 7th level of the National Qualifications Framework of the Republic of Kazakhstan, Industry qualification framework "Services in the field of technical regulation», 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 related to the necessary types of scientific and educational activities, adjusted to meet the requirements of stakeholders.

The uniqueness of EP 7M07513- Metrology, is that ensuring the unity of measurements is a mandatory requirement for enterprises and organizations of all industries, knowledge and understanding of which are acquired as a result of training in this program, and which allows graduates to acquire the necessary competencies and skills in the field of modern aspects of metrology development, research and teaching in the field of ensuring the uniformity of measurements.

The educational program aims to achieve learning outcomes through the organization of the educational process using the principles of the Bologna process, student-centered learning, accessibility and inclusion.

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: research, on the basis of enterprises and organizations related to the theme of the master's thesis, pedagogical, on the basis of the graduating department, the implementation of the stages of master's theses
- research papers of the undergraduate student (SRWMS): the student's independent scientific work, including the implementation of the master's thesis and scientific internship.

The university has taken measures to maintain academic integrity and academic freedom, protection from any kind of intolerance and discrimination against masters.

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 specialists possessing scientific and pedagogical knowledge in the field of scientific, legislative and applied metrology of the subjects of the system for ensuring the uniformity of measurements.

EP tasks:

- providing conditions for the acquisition of a high intellectual level of development, mastery of logical and critical thinking and skills of scientific organization of metrological support of production, testing processes, verification, calibration of measuring instruments in the overall quality management system of industrial enterprises, TL, BCC, VL/CL, research institutes

-development of the ability to use the acquired knowledge in professional activities to solve scientific, managerial, technical problems, operational decision-making in problem situations to ensure the unity of measurements

- development of skills of self-study and continuous training throughout the professional activity, which will allow masters to successfully adapt to changing conditions

- formation of competitiveness of graduates in the field of Metrology to ensure the possibility of rapid employment in the specialty or continuing education in doctoral studies.

1.2 List of qualifications and positions

The graduate of this EP 7M07513-Metrology is awarded the degree of "Master of technical Sciences".

Masters of technical Sciences in EP 7M07513-Metrology can hold positions in organizations and industrial enterprises - chief metrologist, chief instrument maker, Metrology engineer, Metrology specialist, head of measurement laboratory, in higher educational institutions – head of laboratory, lecturer, senior lecturer, in accordance with the qualification requirements Qualification Handbook for managers, professionals and other employees, approved by order of Minister of labor and social protection of population of the Republic of Kazakhstan from may 21, 2012 № 201-ө-м.

1.3 Qualification characteristics of the educational program graduate

1.3.1 Scope of professional activity

The sphere of professional activity is scientific, legislative and practical aspects of metrology and metrological provision of production, systems, processes to ensure the uniformity of measurements at the national, regional and international level, the introduction into practice of modern methods and measuring instruments aimed at improving the level of scientific research, production efficiency, technical level and product quality, organization and management of the measuring laboratory.

1.3.2 Objects of professional activity

The objects of professional activity of the graduate are the scientific aspects of metrology for improving the quality of products and technological processes, in terms of metrological support, testing equipment for measuring laboratories of enterprises and organizations, calibration, calibration and testing laboratories; methods and means of measurement, testing and control; metrological support of scientific, industrial, social and environmental, technical activities; regulatory documentation in the field of metrology and ensuring the uniformity of measurements.

1.3.3 Subjects of professional activity

The subjects of professional activity of the master of technical sciences in accordance with the EP 7M07513-Metrology are:

- systems of reproduction, storage and transfer of dimensions of units of physical quantities
- nomenclature, methods of rationing, assessment and control of indicators of accuracy of measurement results and metrological characteristics of measuring instruments
- principles, techniques and methods of processing measurement results
- NTD (Normative Technical Documentation), requirements for competence and organization of work for accreditation, inspections by the national accreditation body for verification, calibration, testing and measurement laboratories
- regulatory and technical documentation in the field of Metrology for innovative technologies, new technics, equipment and materials
- scientific research to ensure the production of quality products, implementation of international management systems;
- educational services for the training of specialists in the field of metrology for colleges and universities, enterprises and organizations;

1.3.4 Types of professional activity

The Master of Technical Sciences in EP 7M07513-Metrology can perform the following professional activities:

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

2. EP learning outcomes

LO1 Demonstrate knowledge of a foreign language in professional activities, interpersonal communication, writing scientific articles, understanding worldview and methodological problems arising at the present stage of development of science, evaluate facts and phenomena based on the provisions and categories of the philosophy of science.

LO2 Evaluate the development and effective use of socio-psychological technologies in management, apply the methodology of scientific research, innovative teaching methods of specialized disciplines, critically evaluate the scientific organization of higher education teacher work.

LO3 Demonstrate the ability to work in a team, to be creative and logical thinking when making scientific, managerial and technical decisions in non-standard situations in professional activities.

LO4 Use the scientific provisions of metrology and total quality management for analyze the state of metrological support of production, measurement, testing and quality control of products, services, processes, management systems.

LO5 To conduct analytical work on improving the system for ensuring the uniformity of measurements the General management system of management of subjects based on ISO 9000 standards in various industries with the involvement of information resources; summarize the results in scientific publications.

LO6 Apply acquired knowledge and skills to analyze problems in interdisciplinary related areas of knowledge, independently carry out scientific research in the field of metrology, substantiate the results of research when discussed with experts and a wider audience.

LO7 Effectively work individually and as a member of the team, correctly defend their point of view, adjust their actions and use different methods;

3 COMPETENCES OF EP GRADUATE

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

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

Core competencies:

(CC1) *language*

- ability to master basic communication skills in a foreign language in a professional field, both verbally and in writing, mediation and intercultural understanding; 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, presenting and exchanging information through a computer, participating in collaborating networks using digital technologies in the field of professional activity;

(CC2) *technical*

- the ability to use educational potential, knowledge and experience acquired during the study of technical disciplines in professional activities and use them to analyze and solve non-standard problem situations; ability to manage the preparation of materials for laboratory accreditation; the ability to carry out metrological activities, develop new ways of obtaining information and test them in scientific and educational activities to update and deepen the knowledge necessary for professional activities and continuing education in doctoral studies;

(CC3)*managerial and entrepreneurial*

- the ability to own the skills of critical thinking, interpretation, creative analysis, conclusion conclusions, evaluation; manage scientific projects to achieve professional goals, manage personnel, organize the necessary certification and re-certification of personnel, demonstrate entrepreneurial skills; ability to find compromises, correlate your opinion with the opinion of the team; ensure effective interaction of laboratory departments; possess business ethics standards; strive for professional and personal growth; work in a team, correctly defend their point of view, offer new solutions; demonstrate tolerance towards other individuals;

(CC4) *research*

- the ability to plan and carry out research in the field of metrology and metrological support of production, measurement, testing and control with the aim of scientific, patent and marketing support, ongoing research; the ability to summarize the results of research work in the form of scientific publications, to defend their position during the discussion and make professional decisions under conditions of uncertainty and risk;

(CC5) *methodological*

- the ability to analyze and comprehend the realities of modern theory and practice of metrological activity in enterprises, in scientific organizations, based on the application of the methodology of natural science knowledge, new methods of teaching specialized disciplines in educational activities; organizing and conducting research in the field of metrology.

Professioanal competencies:

PC 1 pedagogical

- ability to own teaching skills: 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 management systems of educational activities in relation to the conduct of training sessions and the development of educational methodological documentation in the field of metrology.

PC 2 scientific

- understanding and creative use in scientific and pedagogical activities of knowledge of

fundamental and applied sections of metrology: development of methods and organization of various scientific research, experiments in the field of metrology and metrological support of production, measurement and testing, analysis of their results, development and harmonization of regulatory documents in the field of metrology with international requirements, writing skills of articles, reports and theses on research work, public appearances tions on the results of scientific research, design of scientific and technical reports, fixing and protection of intellectual property

PC 3 engineering

- determine the development strategy of metrological support for production facilities and measurement laboratories, measurement and testing processes, the introduction of new equipment, technologies, measuring instruments, testing equipment, the development of new measurement and control methods, the application of engineering methods in managing product quality, processes, work, personnel management in practical activities of enterprises and organizations.

PC 4 resource saving

- the ability, based on the knowledge of scientific, legislative and technical foundations of metrology, to assess the need for resources and plan their use in solving the problems of metrological support of production, confirmation of conformity of products by quantitative and qualitative indicators, environmental and technical safety of production, health and labor protection, working personnel, introduction of new technologies, equipment , testing and metrological control and supervision.

PC 5 innovative

- the ability to apply the methodological principles of improving the system for ensuring the uniformity of measurements in planning and producing new innovative products, to understand international requirements for measurement methods, testing and control, introducing international quality management systems, increasing staff motivation in the final results of their work, meeting quality goals, applying new test methods and controls in the field of confirming the conformity of products, personnel, quality systems with domestic TL, VL , CL for formulating and solving problems on the removal of technical barriers to domestic enterprises and the recognition of certificates of Kazakhstan and the acts of trials.

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

	P1	P2	P3	P4	P5	P6	P7
CC1	+		+			+	
CC 2		+			+		+
CC 3	+		+				+
CC 4	+			+	+	+	
CC 5		+		+		+	
PC 1		+	+				+
PC 2	+	+		+	+		
PC 3				+		+	+
PC 4			+	+		+	
PC 5	+	+				+	

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		Number of KZ credits					Total hours	Total KZ credits	The number of	
			VC	EC	Theoretical training	Teaching practice	Research practice	SRWMS	Final examination			exam	Diff. offset
1	1	3	5	2	28			2		900	30	7	1
	2	2	-	4	20	8		2		900	30	4	2
2	3	2		3	16		12	2		900	30	3	2
	4	2						18	12	900	30		1
Total			**5**	**9**	**64**	**8**	**12**	**24**	**12**	**3600**	**120**		**6**

5. Information about disciplines

Module name	CYCLE	VC/ EC	Component Name	Brief course description (in 30-50 word)	Number of credits	Formed PO (codes)
Module of Scientific and Pedagogical Training	BD	VC	History and Philosophy of Science	History and philosophy of natural and technical sciences. New European science in culture and civilization, the emergence of science, its historical dynamics, the structure of scientific knowledge, the philosophical problems of specific sciences. Communication technologies of the XXI century and their role in modern science. Philosophical problems of the development of modern global civilization. Modern actual methodological and philosophical problems of natural and social sciences and humanities.	3	LO1 LO2 LO3
			Foreign Language (Professional)	Mastering the main types of reading foreign-language original sources with varying degrees of content coverage. Development of skills for preparing written communications on scientific topics in the specialty: scientific report, abstracts on the topic of scientific research, abstracting of original sources in a foreign language, annotation of a scientific text, summary. Understanding the general content of authentic records. Listening to lectures, messages containing professional information. Development of oral communication skills in the specialty: presentation with a scientific report, presentation of scientific research, scientific	3	LO1 LO2 LO3

				discussion, scientific debates, the use of situational games.		
			Psychology of Management	The main approaches and principles of modern psychological science, necessary in the professional activities of highly qualified specialists. Formation of the scientific-theoretical worldview on the fundamental psychological concepts, the development of ideas about psychological science, revealing the content of the discipline. Formation of skills and habits of psychological research of a personality, acquaintance with the main methods of experimentally - psychological research and the main directions of psycho-correction work. Features of conflict management, stress and methods of their resolution.	3	LO1 LO2 LO3
Module of Scientific and Pedagogical Training	BD	VC	Higher School Pedagogy	Modern higher education paradigms. The system of higher vocational education in Kazakhstan. Methodology of pedagogical science. Professional competence of a high school teacher. The organization of the educational process on the basis of the credit system of education in higher education. Methods and forms of training in the preparation of future professionals. New educational technology in higher education. Higher school as a social institution of education and the formation of the personality of a specialist.	3	LO1 LO2 LO3
	PD	VC	Methods of Teaching Special Disciplines	Knowledge of the features of teaching special disciplines in the field of metrology and metrological support, understanding of modern technologies of organizing the learning process	5	LO4 LO5 LO6 LO7

				and controlling the quality of students' knowledge, skills of conducting training in the subjects of the professional cycle in the field of metrology and metrological support, developing educational and methodical documentation, ability to analyze the content of the educational process in professional cycle subjects		
	BD	VC	Pedagogical Practice	Ability to master new requirements for modern teachers, the work of a university teacher as a scientist, teacher, educator, public figure, use of logical and critical thinking to solve problems in the field of metrology and metrological support, awareness of the social significance of their future profession and the acquisition of motivation to perform professional tasks , self-acquisition of new knowledge, using modern educational and information technologies, the development of professional research lskoy culture in the field of metrology and metrological support, the formation of professional and pedagogical skills in their professional work, cultural scientific and pedagogical thinking.	8	LO3 LO4 LO5 LO6
Scientific basis of the system for ensuring the uniformity of measurements and business processes of MS ISO 9000 series	PD	EC	The system of technical regulation and metrology	To know the legislative base of the Republic of Kazakhstan, the countries of the Commonwealth of Independent States, CU of the EurEU of technical regulation systems, ensuring the unity of measurements, state control over compliance with the mandatory metrological norms and rules, the ability to apply them in practical and scientific activities. Analyze the issues of reforming the state system of technical	6	LO5 LO6 LO7

				regulation and metrology, skills in developing programs and plans for their reform and improvement, the application of regulatory documents of the technical regulation system and metrology in their professional activities		
			International standards ISO 9000 for quality management of metrological activities	Knowledge and understanding of theoretical-philosophical and conceptual patterns, principles and methods of personnel management based on ISO 9000 standards, apply various international standards in the field of their professional activities, analyze the activities of international organizations on standardization and certification in the field of quality management, skills in applying international requirements for the development, coordination and adoption of international standards in the Republic of Kazakhstan.		LO3 LO5 LO7
	BD	EC	Metrological examination of design documentation	Knowledge of the types of design documentation, methodological aspects of metrological expertise, the ability to analyze and evaluate technical solutions based on metrological expertise, analyze identified inconsistencies, have the skills to draw up acts, metrological expertise, develop the most rational solutions for metrological support of new equipment, equipment and technologies	5	LO4 LO5 LO7
			Expert auditors in the field of ensuring the uniformity of measurements	Knowledge and understanding of the regulatory and methodological framework of the system for ensuring the uniformity of measurements, the rules of preparation, certification and re-certification of experts of auditors in the field of ensuring the unity of measurements, the types of		LO5 LO6 LO7

				activities for which experts of auditors are certified, qualification requirements for candidates for expert auditors, analyze the reasons for refusal and cancellation of certificates on qualification, skills in the preparation of documents for obtaining the qualification of an expert auditor, conducting an audit in the withered field of activity		
Theory and practice of measurement	PD	EC	Engineering Methods of Quality Management	Knowledge of the methodological and practical aspects of the application of engineering methods in the enterprise quality management system, the ability to carry out the selection of engineering methods depending on the object of research, analysis of the causes of defects, defects, inconsistencies, information collection skills for designing complex technical systems, monitoring business processes		LO4 LO5 LO7
			Quality Engineering	Knowledge of the etymology of the concept of quality, the main directions of quality engineering, understanding the concept of quality, skills in applying quality engineering methods for designing objects, developing quality plans, tools and operational schemes of an applied nature, including pre-design feasibility studies and substantiation of planned investments, necessary laboratory and experimental the development of technologies and prototypes, their industrial development, as well as subsequent services and consultations	5	LO4 LO5 LO6
			Modern aspects of metrology development	Knowledge of modern aspects of the development of metrology as a science, the role of metrology in ensuring the uniformity of	4	LO3 LO5 LO7

				measurements, understanding the laws of distribution, analyze measurement schemes, factors influencing measurement results, skills of processing measurement results, establishing mathematical models of measured values and measuring instruments		
			Modern test methods and metrological quality control of products, processes	Knowledge of modern test methods, understanding of the procedures for metrological quality control of products, regulatory requirements for the development of test methods, the ability to plan and organize a system of metrological control of product quality, skills for developing test methods, testing products, drawing up test reports for product quality, their development, certification and implementation , the qualification of test results, intercomparison tests, the calculation of measurement results uncertainty		LO2 LO5 LO7
	BD	EC	Theoretical framework for assessing measurement uncertainty	Knowledge of the theoretical and practical bases for assessing the uncertainty of measurement results, harmonized with international requirements normative documents for assessing the uncertainty of measurement results Ability in practice to assess the uncertainty of measurement results of various physical quantities. Skills in the field of practical calculations, assessment of uncertainty in measurements, characteristics of accuracy of measurement results, quantitative determination of the quality of measurement results	5	LO6 LO7
			The concept of uncertainty of	Knowledge of international standards in the field of uncertainty of measurement results, the		LO5 LO6

			measurement and test results	regulatory framework of the concept of uncertainty, the requirements of fundamental standards in the practice of assessing uncertainty in measurements, characteristics of the accuracy of measurement results. The ability to practice the assessment of the uncertainty of measurement results and tests of various physical quantities. Skills in the application of the concept of uncertainty in measurement and testing, quantify the quality of measurement and testing results		
Regulatory and technical base of metrology	PD	EC	Technical and software means of metrological support	Knowledge of hardware and software for metrological support of production, testing and control, their development and formation, use of hardware and software to improve metrological support of production, testing and control to ensure the unity of the measurement system based on the introduction of new hardware and software	6	LO2 LO4 LO5 LO7
			The theoretical foundations of information and measuring equipment	Knowledge of the basic concepts of information and measuring equipment, information theory of measurements, theoretical aspects of the use of information and measuring equipment, analysis of IIT metrological characteristics, ability to plan and select the necessary IIT when introducing new technologies, processes and systems, accuracy calculation skills, measurement accuracy, accuracy and errors control, the choice of IIT in solving scientific and industrial problems.		LO3 LO4 LO6 LO7
			Regulatory and technical documents on ensuring	Knowledge and understanding of normative-technical documents on ensuring the uniformity	5	LO4 LO5

			the uniformity of measurements	of measurements, compliance with the rules, norms established in standards and regulatory documents, skills to apply regulatory legal acts, regulatory documents (ND) to ensure the uniformity of measurements in practical metrological activities and scientific research.		LO6
			Regulatory documents of the state metrological control	Knowledge of objects of state metrological control, regulatory requirements for the development of ND, the legal basis of the MMC, understanding of the methodological aspects of the development and harmonization of regulatory documents with international and regional requirements in the field of metrology		LO2 LO3 LO4
Practical aspects of metrological quality control of products and processes	PD	EC	State metrological control	Knowledge of the objects of state metrological control, the legislative basis for conducting mining and metallurgy, understanding the rules for assessing and classifying market economy subjects according to the degree of risk, their duties and rights, ability to plan the stages of conducting mining and metallurgy, analyze the causes of violations, instructions for writing regulations and acts of verification, and imposing administrative fines	5	LO3 LO4 LO6
			The system of state control and supervision	Knowledge of the “Entrepreneurial Code” of the Republic of Kazakhstan, the Law of the Republic of Kazakhstan “On Administrative Violations”, objects of state control, including in the field of metrology, understanding the organizational structure of the system of state control and supervision, requirements for official duties and rights of state inspectors, ability to select market economy entities depending on the		LO4 LO5 LO7

				degree of risk for planning planned and extraordinary inspections, the skills of drawing up notifications about conducting GKiN, acts and instructions of the results of inspections rock, administrative penalties, depending on the type of violation		
			Organizational basics of accreditation of testing laboratories to confirm the conformity of products	Knowledge of the methodological and scientific basis of accreditation of testing laboratories to confirm the conformity of products, the requirements of ISO / IEC 65, ISO / IEC 17025 to the activities of subjects of accreditation, testing laboratories to confirm, understanding the criteria and conditions for accreditation of subjects of accreditation, skills to assess the activities of subjects of the accreditation system, determine the cost of peer review, state control of accredited certification bodies and testing laboratories	6	LO2 LO3 LO4 LO6
			Organizational foundations of the accreditation system of IL, PL, CL	Knowledge of the methodological and scientific basis of the accreditation system, the requirements of international accreditation systems - ILAC, IAF, EA requirements of ISO / IEC 65, ISO / IEC 17025 standards for the activities of subjects of the accreditation system, understanding the criteria and conditions for accreditation of subjects of accreditation, determining the value of the work of expert evaluation, the state control of accredited certification bodies and testing laboratories		LO2 LO3 LO5 LO7
			Research Practice	Knowledge and understanding of the latest theoretical, methodological and technological achievements of domestic and foreign science in	12	LO2 LO3 LO4

				the field of metrology, the laws of the processes of ensuring the uniformity of measurements in various industries. the ability to establish a connection between the fundamental sciences on which metrology is based, the skills to perform scientific research on the topic of the thesis in accordance with the individual plan.		LO5 LO6 LO7
			Master's research work	Conducting research work, according to the plan of the academic period with the use of regulatory, technical base of the laboratory of the department and UNPK. The use of information technology and computer programs in the performance of final qualifying work. Selection and justification of the methodology of research in accordance with the theme of the master's thesis. Determining the practical results of a master's thesis. Formation of conclusions in all sections of the work.	24	LO1 LO2 LO3 LO4 LO5 LO6 LO7
Module of Final Attestation			Registration 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 the field of scientific and pedagogical knowledge in metrology, metrological support of production, testing, measurement and control, quality management of metrological activities in various industries.Master's thesis defense is held at the open meeting of the State Examination Commission	12	LO2 LO3 LO4 LO5 LO6 LO7

AGREEMENT SHEET

on Education Program 7M07513-"Metrology"

Director of IPE _____ Konarbaeva Z.K.
Signature

Head of ASD _____ Zhangabay N.Zh.
Signature

Head of DnPiK _____ Bazhirov T.S.
Signature

Appendix 1

REVIEW

on the educational program 7M07513-Metrology,
developed in M.Auezov SKSU, Shymkent

1. Brief description of the enterprise and its profile

The department closely cooperates with the Department of the Committee for Technical Regulation and Metrology, which is a territorial unit of the authorized body of the Republic of Kazakhstan for technical regulation and metrology on the basis of the Memorandum of Cooperation for Metrology for All, concluded with the university in 2016 of the Memorandum of Cooperation enterprises of the regional economy.

The relevance and relevance of EP

The urgency of the EP is due to the need to train scientific and pedagogical personnel in the field of metrology in connection with the increasing interest of managers of industrial enterprises, testing, calibration and calibration laboratories, conformity assessment bodies, as well as an extensive network of state control and supervision bodies in the field of technical regulation and metrology compliance with the requirements of the system for ensuring the uniformity of measurements in all enterprises of the country, colleges and call, leading technical training in this direction. Practical use of the results of EP serves as the basis for meeting these needs, improving the quality of education and the effectiveness of integration processes in the European educational space.

In the EP, there is a clear connection between the results of training and competences with the demands of the labor market, which allow:

- integrate knowledge, use it to solve scientific, analytical and managerial tasks in the field of metrology in the context of a new model of economic growth of our country based on innovations, the development of knowledge-intensive industries, information technologies;
- to carry out work on updating, developing regulatory documents in the field of metrology with the involvement of modern information technologies;
- summarize the results of research and analytical work in the field of metrology in the form of articles, reports, analytical notes, etc .;
- to conduct scientific analysis and solutions of practical problems in the organization of scientific and educational activities to improve the quality of the metrological component of production technologies, works and processes using the scientific foundations of metrology.

The EP has introduced such disciplines as modern test methods and metrological control of product quality, processes, systems, experts - auditors in the field of ensuring the uniformity of measurements, theoretical foundations for assessing the uncertainty in measurements, technical and software tools for metrological support, regulatory and technical documents on ensuring unity measurements, state metrological control, engineering quality management methods, the organizational basis for the accreditation of testing laboratories confirmation of the conformity of products, the results of which are taught, allow graduates of secondary education to acquire knowledge and competencies in the field of metrology and metrological support of production, measurement, testing and control demanded on the labor market.

3. The presence of components that develop practical skills

The content of the EP is aimed at training specialists who are able to adapt in the new conditions and use innovative approaches to solve the problems of metrology and metrological activity, ensure measurement uniformity, apply the latest discoveries in the field of metrology at enterprises of various industries and introduce them into work practice.

4. Content of the educational program (modules, disciplines)

The modular educational program contains modules that form the skills and competencies in the field of the scientific foundations of metrology, the training of auditors in the field of

measurement assurance, the use of modern measurement methods, testing and metrological quality control of products, processes, systems, hardware and software for metrological support of production. , research and measurement, state metrological control, metrological examination of design documentation, development and updating of ND in metrology with international requirements, scientific and organizational basis for accreditation of IL, PL, CL, OPS, pedagogical training with knowledge of a professional foreign language, allowing to solve professional problems of scientific and pedagogical direction in the field of metrology and metrological activity in all sectors industry.

5. EP conclusion

The educational program 7M07513- Metrology, is aimed at preparing masters of scientific and pedagogical direction in the field of metrology and metrological support of production, tests, systems that can use appropriate methods to conduct detailed research, technical issues in accordance with their level of knowledge and understanding, plan and conduct analytical , imitation, experimental studies, ways to use new and new technologies in the field of their activities, apply scientific e, and technical methods of metrology, engineering processes, measuring instruments, testing equipment, technical literature and information sources, to solve the broader, non-technical implications of engineering practice: ethical, environmental, economic and industrial, to teach in colleges and universities in their specialty.

Head of the Technical Committee Department for technical regulation and metrology in the city of Shymkent Eskaraev B.A.

Appendix 2

Expert opinion
on the educational program 7M07513-Metrology

1. The relevance of the EP 7M07513-Metrology is due to the need to train scientific and pedagogical personnel in the field of metrology to perform their strategic tasks to improve the system of technical regulation and metrology in the priority sectors of the economy of the Republic of Kazakhstan aimed at ensuring the uniformity of measurements, eliminating technical barriers to trade by creating in the country, the conditions of reliability and traceability of measurement results and tests based on international standards, the introduction of international native practice of confirming the competence of domestic testing, calibration and calibration laboratories to conduct certification tests of various products

2. Compliance with formulated objectives, consistent with the mission of the university, the needs of employers and undergraduates

The EP corresponds to the goals set forth in it and is consistent with the mission of M. Auezov SKSU on the training of scientific and pedagogical personnel in the field of metrology on the basis of advanced knowledge and achievements of science, technology and technology.

The presented objectives of the EP are formulated and concretized in context with the requirements of undergraduates, since they are formed on the basis of Dublin descriptors and are expressed through competences: in the field of professional foreign language, management), fundamental scientific and pedagogical training in the field of metrology, additional and professional competencies in the field of metrology activities of the system of ensuring the unity of measurement, measurement, testing, control and management of the quality of products, works, processes and systems

The employers' requests are specified in order to reflect the potential of the EP to provide undergraduates with solid training in the field of the scientific foundations of metrology, which will allow them to successfully compete in the labor market in all relevant fields, ranging from a metrologist engineer to a teacher of higher qualification at universities and colleges in the country. A branch of the FTSH RSE Kazakhstan Institute for Standardization and Certification, the Department of Technical Regulation and Metrology Committee for Maintenance, a number of industrial managers, heads of testing laboratories took an active part in the development of the educational program.

Compliance with the National Qualifications Framework of the Republic of Kazakhstan

The national qualifications framework contains eight qualification levels, which corresponds to the European qualifications framework and educational levels defined by the Law of the Republic of Kazakhstan “On Education”. Educational program 7M07513- “Metrology corresponds to the seventh level of qualifications of the NQF of the Republic of Kazakhstan and is necessarily coordinated with potential employers.

3. Reflection in the EP, learning outcomes and competencies based on Dublin descriptors laid down in professional standards / industry framework

The curriculum contains learning outcomes and competencies based on Dublin descriptors, namely:

A. knowledge and understanding;

B. the use in practice of knowledge and understanding;

C. ability to make judgments and formulate conclusions;

D. communication skills;

E. Skills in the field of education, taking into account the second level of training (magistracy), as provided for by the requirements of the Bologna process, which allow undergraduates in this direction to acquire professional competence:

Acquisition of undergraduates, specialized competencies in the field of metrology

Development of theoretical and practical research skills in the field of metrology

Preparation for teaching in the field of metrology for educational organizations

Accumulation of knowledge through original scientific research in the field of metrology

The ability to apply and adapt knowledge through a conceptual understanding of the main disciplines;

Ability to understand problems from a global perspective;

The ability to adapt to new conditions and use innovative approaches to solve problems;

The ability to critically analyze and question knowledge in a specialized field;

Ability to demonstrate knowledge of theories, models and tools related to the field of metrology

1. Compliance with SCSE

The content of the educational program in terms of structure, content and volume is fully consistent with the SES approved by the PP of the Republic of Kazakhstan dated 23.08.2012. No. 1080, with amendments and additions dated May 13, 2016 No. 292

Thus, the OP is developed in accordance with the regulatory documents of the MES, including curricula and curricula of disciplines, according to the rules of modular structuring, competence approach and accounting for the results of the development of modules and the entire modular curriculum in KZ credits.

Curricula are based on the principles of continuity, continuity and adaptability, contain a list of disciplines, the number of credits, placement by semester, types of classes and forms of control. All subjects of the curriculum involve the study of semesters taking into account the logical sequence on the basis of prerequisites and post-requisites. The structure of the curriculum 2 cycle of disciplines distributed among the components. Along with this, the volume of loans, SIW, research and teaching practices, SRWMS are reflected. Structure and content of EP, application of the modular principle of their construction

In the educational program 7M07513 -Metrology is implemented in a modular learning system. It helps to solve the problems of systematization of knowledge, their best assimilation and is to split information into certain doses – modules that provide the necessary control, flexibility and dynamism of the learning process. The module is not only a section of the educational program, but also a system based on the interaction of different methods and methods of educational activities, ensuring the entry of this module into the integrated system of education.

2. The presence of components in the EP to prepare for professional activities, developing key competencies, intellectual and academic skills, reflecting the changing requirements of society.

3. EP is aimed at the acquisition of professional competences which the students develop the readiness for changes in social, economic, professional roles, geographic and social mobility in terms of increasing the dynamism of change and uncertainty.

4. Logical sequence of disciplines and reflection of the main requirements in curricula and training programs

The sequence of modules/disciplines in the EP is logically justified, the principles of continuity, continuity, accessibility and consistency of the content of education in the curricula and training programs are implemented

5. Reflection in the EP system of accounting for the workload of undergraduates and teachers in loans, its compliance with the parameters of the credit system of education.

In the EP reflects the accounting system of an academic load of undergraduates and faculty in the credits, through the formation of the pivot table, reflecting the volume of loans in the context of the modules of the educational program and in the form that describes the module structure, including the number of credits for its development

The presence in the programs of professional practices - pedagogical and research to consolidate the theoretical material expressed in the academic load in credits.

In the EP there is a section "Providing professional practices: their types, main typical places for organizing and conducting, evaluating results" which reflect the goals, objectives and results of professional practices for graduate students of EP, the study load in the credits is given in the summary table reflecting the amount of credits practiced in terms of modules of the educational program

Qualifications obtained as a result of the development of EP

Qualifications obtained as a result of the development of EP - Master of Technical Sciences in the specialty 7M07513- "Metrology"

Chairman of the expert committee:
k.t.s.., Associate Professor _____ Abzalova D.A.

Members of the expert committee:

d.t.s., Professor _____ Pecherskiy V. N..

k.t.s., Associate Professor _____ Zhantasov M.K.

doctor PhD _____ Kaldybaeva B.M.