Institute _____ **Energy and Mechanical engineering** _____

Department __ **Mechanical engineering** _____

EDUCATIONAL PROGRAM

7M07112 - Digitalization of engineering manufacturing

the name of educational program

Code and name field of education:
7M07-Engineering, manufacturing and civil engineering
Code and classification direction of personnel training:
7M071-Engineering and engineering trades
Group of educational programs:
M103-Mechanics and metal working
EP purpose: 7
EP type: 7
Period of study: 2 years
Volume of the credits: 120

Almaty 2022

Educational program 7M07112 - Digitalization of engineering manufacturing
(the name of educational program)

was approved at the meeting of K.I. Satbayev KazNRTU Academic Council

Minutes 13 dated « 28 » 04 2022.

was reviewed and recommended for approval at the meeting of K.I. Satbayev KazNRTU Educational and Methodological Council

Minutes 7 dated « 26 » 04 2022.

Educational program _7M07112- Digitalization of engineering manufacturing
code and name of the
(the name of educational program)
educational program developed by the academic committee in the direction «7M071-Engineering and engineering trades»

Full name	Academic degree/ academic title	Position	Workplace	Signature
Chairperson of Academic Committee:				
Nugman E.Z.	Doctor PhD	Head of the Department of "Mechanical Engineering"	NAO KazNRTU named after K.I. Satpayev, Institute of Energy and Mechanical Engineering	
Teaching staff:				
Kerimzhanova M.F.	Candidate of Technical Sciences, Associate Professor	Professor	Department of Mechanical Engineering	
Issametova M.E.	Candidate of Technical Sciences	Assoc. Professor	Department of Mechanical Engineering	
Smailova G.A.	Candidate of Technical Sciences	Assoc. Professor	Department of Mechanical Engineering	
Employers:				
Azimbekov M. K.		Director	LLP "Zhaken Kalsha"	
Students				
Esmukhambetova D.E.		2nd year Master's student	Department of "Mechanical Engineering"	

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List of abbreviations and designate

ECTS	European Credit Transfer and Accumulation System
BD	Basic disciplines
HEI	Higher education institution
SMSE	State mandatory standard of education
KazNRTU	K. I. Satpayev Kazakh National Research Technical University
MEP	Modular educational program
НАО	Некоммерческое акционерное общество
RWMS	Research work of a master's student
EP	Educational program
PD	Profile disciplines
WC	Working curriculum
IWMS	Independent work of a master's student
EMC	Educational and Methodological Council
AC	Academic council

1 Description of educational program

The professional activity of graduates of the educational program is aimed at digitalization of machine-building production, the use of innovative technologies in the field of mechanical engineering.

The direction of the educational program covers engineering and engineering. The objects of professional activity of the master in EP 7M07112 - " Digitalization of engineering manufacturing" are:

-digitalization of machine-building production, including information-sensor, executive and control modules, their mathematical, algorithmic and software, methods and means of their design, modeling, experimental research and design;

- theoretical and experimental studies of digitalization of machine-building production for various purposes.

A master's degree in the field of training " Digitalization of engineering manufacturing" should be prepared to solve professional problems in accordance with the profile orientation of the master's program and types of professional activity:

research activities:

- analysis of scientific and technical information, domestic and foreign experience in the field of development and research of digitalization of machine-building production; study of new methods of control theory, artificial intelligence technologies and other scientific areas that make up the theoretical basis of digitalization of machine-building production, compilation and publication of reviews and abstracts;

- carrying out theoretical and experimental research in the field of development of new samples and improvement of existing digitalization of machine-building production, their modules and subsystems, search for new additive technologies;

- conducting patent research accompanying the development of new digitalization of machine-building production, in order to protect intellectual property objects, the results of research and development;

- development of experimental samples of digitalization of machine-building production, their modules and subsystems in order to verify and substantiate the main theoretical and technical solutions to be included in the terms of reference for the implementation of development work;

- organization and conduct of experiments on the existing digitalization of machine-building production, their subsystems and individual modules in order to determine their effectiveness and identify ways to improve, processing the results of experimental research using modern information technologies;

- preparation of reports, scientific publications and reports at scientific conferences and seminars, participation in the implementation of research and development results into practice;

design and engineering activities:

- preparation of a feasibility study of new digitalization projects of machine-building production, their individual subsystems and modules;

- calculation and research of digitalization of machine-building production, control, information-sensor and executive subsystems using mathematical modeling methods, conducting mock-up and testing of existing systems, processing experimental data using modern information technologies;

- development of special software for solving design problems of digitalization of machine-building production, development of technical specifications and direct participation in the design of additive machines and equipment;

organizational and managerial activities:

- development of organizational and technical documentation (work schedules, instructions, plans, estimates) and established reporting on approved forms;

- organization of the work of small groups of performers involved in research, design work and experimental research;

- control over the implementation of measures for the prevention of occupational injuries, occupational diseases, prevention of environmental violations in the process of research and operation of digitalization of machine-building production;

installation and commissioning activities:

- participation in verification, adjustment, adjustment, assessment of equipment condition and setting up digitalization of machine-building production for various purposes, including both technical means and software control systems;

- participation in the coupling of software and hardware complexes with technical objects as part of the digitalization of machine-building production, in testing and commissioning of prototypes of such systems;

service and operational activities:

- participation in verification, adjustment, adjustment and assessment of the state of digitalization of machine-building production for various purposes, as well as their individual subsystems, in setting up control hardware and software complexes;

- preventive control of the technical condition and functional diagnostics of digitalization of machine-building production for various purposes, as well as their individual subsystems;

- preparation of operating instructions for digitalization of machine-building production and their hardware and software, development of routine testing programs;

- preparation of applications for equipment and components, preparation of technical documentation for equipment repair;

scientific and pedagogical activity:

- participation in the development of programs of academic disciplines and courses based on the study of pedagogical, scientific, technical and scientific-methodical literature, as well as the results of their own professional activities;

- preparation of applications for equipment and components, preparation of technical documentation for equipment repair;

scientific and pedagogical activity:

- participation in the development of programs of academic disciplines and courses based on the study of pedagogical, scientific, technical and scientific-methodical literature, as well as the results of their own professional activities;

2 The purpose and objectives of additional educational program

EP purpose:

High-quality training of highly qualified and competitive specialists with creative thinking, ready for production, technological, scientific and pedagogical activities in the conditions of innovative digital engineering.

EP tasks:

- formation of knowledge of the basics of digital technologies in the field of mechanical engineering;
- acquisition of theoretical and practical knowledge on the organization, conduct of scientific and experimental research in the field of development of technological processes of machine-building products;
- formation of knowledge and skills in the analysis of scientific and technical information, new methods of control theory, scientific directions of digital engineering;
- formation of knowledge and practical skills of performing scientific and pedagogical activities, the use of computer and distance learning.

3 Requirements for evaluating the learning outcomes of an educational program

As a result of mastering the OP modules, students develop the knowledge, skills and abilities necessary to carry out all types of professional activities in the field of mechanical engineering, develop training skills to carry out further training with a high degree of independence, that is, the formation of professional, communication and key competencies that meet the requirements of employers. The qualification assigned to the graduate is Master of Technical Sciences in OP 7M07112 - "_Digitalization of engineering manufacturing_".

4 Passport of the educational program

4.1 General information

№	Название поля	Примечание
1	Code and name field of education	7M07- Engineering, manufacturing and civil engineering
2	Code and classification direction of personnel training	7M071- Engineering and engineering trades

3	Group of educational programs	M103- Mechanics and metal working
4	Name of the educational program	7M07112 - "Digitalization of engineering manufacturing".
5	Short description of the educational program	The professional activity of graduates of the educational program is directed to the field of digitalization of machine-building production. In the educational program, students will receive professional knowledge of digital design and modeling of product structures, advanced materials and additive technologies; current problems of scientific research, the basics of research activities, lean digital production, scientific and pedagogical activities. They will acquire the skills of designing and developing business processes, technological processes of additive manufacturing, analysis of automated production technologies.
6	EP purpose	The purpose of EP 7M07112 - Digitalization of engineering manufacturing is the qualitative training of highly qualified and competitive specialists with creative thinking, ready for production, technological, scientific and pedagogical activities in the conditions of innovative digital engineering.
7	EP type	New EP
8	Level on NQF	7
9	Level on SQF	7
10	EP distinctive features	No
11	List of competencies of the educational program:	- Ability to follow ethical standards in professional activity; - The ability to plan and solve problems of their own professional and personal development. - Ability to critically analyze and evaluate modern scientific achievements, generate new ideas when solving research and practical tasks; - The ability to design and carry out comprehensive research based on a holistic systematic scientific worldview using knowledge in the field of history and philosophy of science; - Willingness to participate in the work of domestic and international research teams to solve scientific and scientific-educational tasks; - Willingness to use modern methods and technologies of scientific communication in the state and foreign languages;
12	Learning outcomes of the educational program:	ON1 Develops and improves the intellectual and general cultural level, expands and deepens the scientific worldview, uses new knowledge and skills in practical activities. ON2 Applies and observes the rights and duties of a citizen, ethical and legal norms in society and the collective. ON3 Demonstrates the ability to search for new scientific and technical information, based on the integration of knowledge in relation to the professional field, the use of a foreign language for business communication.

		ON4 Shows readiness for research and project work in the field of digital machine-building production, in related fields related to the selection and development of new research methods ON5 Demonstrates readiness for self-study and professional development and personal growth in professional activity. ON6 Possesses a set of personal qualities, scientific, pedagogical and professional competencies for production, pedagogical and research activities. ON7 Proficient in the principles of innovation management, business activities, quality and risk management in digital engineering. ON8 Demonstrates knowledge in the field of modern methods of organization and planning of scientific and experimental research, production and quality control of automated production. ON9 Demonstrates the ability to analyze, evaluate and synthesize modern innovative technologies, design methods and modeling of digital production processes. ON10 Demonstrates readiness to use computer and information technologies to solve practical and scientific problems in the field of digitalization of mechanical engineering. ON11 Applies sound design solutions to ensure the safety of life, environmental and industrial safety of digital machine-building production. ON12 It uses advanced materials for additive manufacturing, automated systems for ensuring the life cycle of products and advanced production automation technologies.
13	Form of training	daytime
14	Period of study	2 years
15	Volume of the credits	120
16	Language of education	russian
17	The awarded academic degree	Master of technical sciences
18	Developer(s) and authors:	The educational program was developed by the academic committee in the direction "7M071-Engineering and Engineering"

4.2 The relationship between the achievability of the formed learning outcomes according to the educational program and academic disciplines

№	Name of discipline	Short description of discipline	Number of credits	The formed educational outcomes (codes)											
				ON1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9	ON 10	ON 11	ON 12
Cycle of basic disciplines University component															
1	English language (professional)	The course is designed for undergraduates of technical specialties to improve and develop foreign language communication skills in professional and academic fields. The course introduces students to the general principles of professional and academic intercultural oral and written communication using modern pedagogical technologies. The course ends with a final exam. Undergraduates also need to study independently (MIS).	5		v	v		v							
2	Psychology of management	The purpose of the discipline is to familiarize students with modern ideas about the role and multidimensional content of the psychological component of managerial activity; to increase the psychological culture of the future master for the successful implementation of professional activities and self-improvement. Studies the main stages, trends and trends in the development of Kazakh and foreign management psychology, the composition and structure of management activities. Special attention is paid to the psychological component of the managerial function, the individual characteristics of the manager,	3						v						

		the ethical and cultural components of the manager, the basics of interaction.													
3	History and philosophy of science	The subject of philosophy of science, dynamics of science, specifics of science, science and pre-science, antiquity and the formation of theoretical science, the main stages of the historical development of science, features of classical science, non-classical and post-non-classical science, philosophy of mathematics, physics, engineering and technology, specifics of engineering sciences, ethics of science, social and moral responsibility of a scientist and engineer.	3	v			v	v							
4	Higher school pedagogy	The course is intended for undergraduates of the scientific and pedagogical magistracy of all specialties. Undergraduates will master the methodological and theoretical foundations of higher school pedagogy, plan and organize the processes of teaching and upbringing, master the communicative technologies of subject-subject interaction between a teacher and a master in the educational process of a university.	3		v			v	v						
Cycle of basic disciplines Elective component															
5	Digital Lean Manufacturing	The purpose of the discipline is to form a systematic representation of the concept of lean production, knowledge of theoretical provisions and regulatory documents in the field of quality management. The discipline studies the basic concepts, the history of the Lean management system, lean manufacturing as a model for improving the efficiency of an enterprise; the principles and essence of quality management systems – Kaizen and 6 sigma. The tools of quality management	5				v						v		

		systems are considered; criteria of economic indicators characterizing changes in the activities of machine-building enterprises.														
6	Advanced Materials for Additive Manufacturing	The discipline studies the place and role of additive technologies in the digital economy. Additive technologies using polymer and composite materials.The physical nature and technological possibilities of application in additive technologies of various materials. Methods of obtaining metal powders, nanomaterials and nanopowders for creating machine parts.	5													v
7	Organization and planning of scientific research	The purpose of the discipline is to acquire theoretical and practical knowledge of the organization, planning and management of scientific research and innovation in mechanical engineering. The discipline deals with design, research, and inventive activities in various fields of mechanical engineering. Modern methods of organizing and planning experiments, advanced scientific and technical means and their application in practice are studied. As a result, the skills of planning research methods, experiments, the use of modern statistical and information technologies for processing research results and their forecasting, the development of experimental technical systems and devices are acquired.	5				v			v	v					
8	Fundamentals of research activity	The purpose of the discipline is the formation of knowledge on the technical foundations of the creative process, conducting scientific research in the field of machine-building complex. The general methods and means of research of technological processes of machine-building production, parameters and their	5				v				v					

		characteristics are studied. The methods of creating new patentable technical solutions, modern methods of conducting scientific research and processing their results are being studied. As a result, the skills of applying advanced research methods, identifying new properties and patterns in technological processes, identifying new technical solutions, formulating the novelty of inventions or utility models and their legal protection are acquired.														
9	Advanced technologies in mechanical engineering	The purpose of the discipline is to acquire knowledge about the laws of the construction of technological processes, optimization of production costs, computer technological environment and complex automation of production. New processing methods in mechanical engineering, methods of thermomechanical hardening of materials, methods of intensification of cutting processes of materials are considered. Electrophysical and electrochemical methods, methods of finishing and finishing workpieces, new metal alloys and non-metallic materials for the manufacture of machine parts are being studied. High-tech manufacturing of engineering products.	5													v
10	3D scanning and digitization	The purpose of the course is to acquire knowledge and skills in the field of scanning 3D models of machine–building production facilities. The discipline studies methods of 3D scanning, description of a 3D object, quality control of manufacturing of final products using a 3D scanner. Computer programs for engineering analysis in the design system are considered, which provide methods of	5				v							v		

		calculations for strength, stability, vibrations and dynamics of solids; types and means of digitizing objects.													
Cycle of profile disciplines University component															
11	Virtual Factory and Augmented Reality	The goal is to form a knowledge system in the field of new business models, business processes and technologies in high–tech industries. The course covers industrial revolutions, Industry development programs 4.0; modern information technologies and marketing; the creation of factories of the future, their architecture. Digital transformation, principles and management of a digital company. The concept of a virtual factory and the construction of logistics networks for a digital factory. "Digital double", technical and operational data.	5									v			v
12	Digital design and modeling	The purpose of the discipline is to acquire knowledge of the basics of computer modeling and computer technologies used in mechanical engineering. The technologies of computer-aided design, rapid prototyping, a complex information model and an integrated information environment used in computer systems supporting the life cycle of mechanical engineering products are considered. Perspective directions of development of computer technologies and industrial systems, virtual engineering are considered. Practical application of computer modeling and design methods in the production of products.	5	v											
13	Technological processes of additive manufacturing	The technological process used in the field of additive technologies is characterized by the management of manufacturing parts based on 3D CAD data. A photopolymerization process in a bath in	5								v		v		

		which a pre-deposited photopolymer is selectively irradiated with light. The process of inkjet applying a material in which the production of an object is carried out by applying drops of building material. The process of spraying a binder in which a liquid binder is selectively applied to the powder materials to be bonded. A synthesis process on a substrate in which the surface of a pre-applied layer of powder material is selectively, completely or partially melted by thermal energy. The process of direct supply of energy and material, in which thermal energy is used to connect materials by fusion as they are applied. The process of sheet lamination in which the manufacture of a part is carried out by bonding sheets of material														
14	Innovative Processes of Digitization for Industrial Manufacturing	The purpose of the discipline is the formation of knowledge in the field of innovation, innovation management, production of digital engineering. The course examines the role of science in innovative development, innovative business; classification and planning of innovations; methods of engineering creativity; theory of solving technical problems; technological approaches and their characteristics. The prospects for the development of high-tech industrial technologies; automation and robotization of machine-building production; digitalization of production are considered	5								v			v		
Cycle of profile disciplines Component of choice																
15	CAE/PLM for Industrial Manufacturing	The purpose of the discipline is to acquire knowledge and skills of working with CAE/PLM design and engineering analysis systems. The discipline studies the modern	5				v					v	v			

		concept of CAD construction, the place of CAD in integrated systems of design, production and operation of engineering products. The features of CAE systems for solving problems of design, production and engineering calculations of machine-building products are considered; the effectiveness of CAD application in the development of new machine designs; software, information, linguistic and technical support of CAD. Computer-aided design of machine parts and assemblies; engineering equipment design.													
16	PLM / PDM processes	The purpose of the discipline is the formation of theoretical knowledge and practical skills in designing machine–building products based on modern software products. The discipline examines PDM (Product Data Management) and PLM (Product Lifecycle Management) systems that provide product lifecycle management: marketing research, design of the production facility, planning and development of the production process, technical support and maintenance, disposal and recycling. Practical application of the programs SOLIDWORKS, Compass 3D, Inventor for the formation of the composition of the product using 3D models.	5										v		v
17	Computer-integrated production	The purpose of the discipline is to form knowledge of the basics of technical training of an automated machine-building complex using modern technological equipment and production management systems. The discipline studies the main characteristics of automated production: modern methods of production organization based on the widespread use of software-controlled technological equipment, microprocessor computing tools, robotic systems, automation tools for design, technological and planned production work. Design and organization of	5										v		v

		machine-building production based on multi-purpose machine tools with software control.													
18	Flexdle production systems and complexes in mechanical engineering	The purpose of the discipline is to acquire theoretical and practical knowledge on the development and operation of flexible production modules in mechanical engineering. The discipline examines the essence of flexible production automation, source data and product range, the structure of flexible production modules, the sequence of module development. The main structural elements of flexible automated production (GAP): automatic transport system, tool support and automatic control systems, production management systems; planning of the GAP, technical and economic assessment of the GAP project.	5												v
19	Actual problems of advanced scientific research	The purpose of the discipline is to acquire knowledge and practical skills in designing technological processes for manufacturing machine parts on automatic lines. The discipline considers the types, composition, principles of construction of automatic lines (AL); types of machine tools, transport and storage system of automatic lines; fixation devices on AL operations; calculation of productivity and operating modes of AL; feasibility study of automated assembly of machines or processing of machine parts. Quality management of machine production at AL.	5			v	v								
20	Risk Management in Digital Manufacturing	The purpose of the discipline is to form knowledge of the basics of digital production management, diagnostics and risk modeling. The discipline examines the essence of risks as an economic category, criteria for risk classification. Development of risk management in practice: stages of the risk management process, methods of risk identification and analysis. The methodology of construction and application of economic and	5							v		v			

		mathematical models of risk analysis and assessment, the basics of risk management in the evaluation activity of a machine-building enterprise using software are studied.													
21	Digital Systems of Industrial Manufacturing	The purpose of the discipline is to acquire knowledge of the design of digital machine-building industries, methods and means of construction based on information and production technologies. The discipline examines the concept of information support for the life cycle of products, the principles of building automated production, the methodology of end-to-end automated design of mechanical engineering products. As a result, students will be able to develop highly efficient technological processes and equipment using modern computer-aided design systems, create new technical solutions in the field of mechanical engineering technology, equipment and tools.	5										v		
22	Operating Systems for Additive Manufacturing	The purpose of the discipline is the formation of professional competencies in the design and development of additive manufacturing technologies. The discipline is based on the study of the methodology of designing additive technological machines and complexes, requirements for additive technological equipment, the manufacturability of equipment. The construction of computer 3D objects based on tomographic data, methods of non-contact formometry and photogrammetry, methods of computer modeling are considered. Are being studied technical means and software of modern additive manufacturing; selection of printing parameters and its optimization.	5									v	v		
23	Occupational Health and Safety for Additive Manufacturing	The purpose of the discipline is to acquire knowledge on ensuring the safety of life in additive manufacturing. The discipline is based on the study of normative and technical documents on labor protection, work safety in	5											v	

		areas equipped with additive equipment. The main categories of work in additive manufacturing are considered: material extrusion, powder layer melting, photopolymerization in a bath, material jet processing, binder jet processing, sheet lamination. Classification of hazards arising during the operation of additive machines and equipment. Safety and security measures for work on additive equipment.													
24	Production Planning and Control	The purpose of the discipline is the formation of knowledge and the acquisition of practical skills in planning and control of machine-building production. The discipline studies the methodology of planning, its features at a machine-building enterprise; conducting marketing research, principles and approaches of operational and calendar planning, material and technical support of production; providing operational activities with the production capacity of the enterprise. The production infrastructure of modern machine-building production, financial planning and control, organizational and technical development and business planning are considered.	5									v			

5. Curriculum of the educational program

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K.I.SATPAYEV

SATBAYEV UNIVERSITY

APPROVED
Chairman of the Management Board-
Rector of ... named after K.Satpayev
... M. Begentaev
... 2022 y.

CURRICULUM
of Educational Program on enrollment for 2022-2023 academic year

Educational program 7M07112 - "Digitalization of machine-building production"
Group of educational programs M103 - "Mechanics and metalworking"

Form of study: full-time | Duration of study: 2 year | Academic degree: Master of technical sciences

Discipline code	Name of disciplines	Cycle	Total amount in credits	Total hours	Classroom amount lec/lab/pr	SIS (including TSIS) in hours	Form of control	Allocation of face-to-face training based on courses and semesters			
								1 course		2 course	
								1 semester	2 semester	3 semester	4 semester
CYCLE OF BASIC DISCIPLINES (BD)											
M-1. Engineering training module (university component)											
LNG210	English (professional)	BD UC	5	150	0/0/3	105	E	5			
HUM214	Management Psychology	BD UC	3	90	1/0/1	60	E		3		
HUM212	History and philosophy of science	BD UC	3	90	1/0/1	60	E		3		
HUM213	Higher school pedagogy	BD UC	3	90	1/0/1	60	E	3			
component of choice											
MSM200 MSM222	Lean digital manufacturing Advanced additive manufacturing materials	BD CCH	5	150	2/0/1	105	E	5			
IND236 IND251	Organization and planning of scientific research Fundamentals of research activity	BD CCH	5	150	2/0/1	105	E	5			
MSM205 IND213	Digitization of machine-building production 3D scanning and digitization	BD CCH	5	150	2/0/1	105	E			5	
CYCLE OF PROFILE DISCIPLINES (PD)											
M-2. Production digitalization module (university component, component of choice)											
MSM201	Virtual factory and Augmented reality production	PD UC	5	150	2/0/1	105	E	5			
MSM218	Digital design and modeling	PD UC	5	150	2/0/1	105	E	5			
MSM204	Technological processes of additive manufacturing	PD UC	5	150	2/0/1	105	E		5		
MSM206	Innovative processes of digitalization of machine-building production	PD UC	5	150	2/0/1	105	E			5	
MSM210 MCH244	CAE/PLM of machine-building production PLM/PDM processes	PD CCH	5	150	2/0/1	105	E			5	
MSM219 ISO246	Computer-integrated production Flexible production systems and complexes in mechanical engineering	PD CCH	5	150	2/0/1	105	E		5		
IND249 IND210	Actual problems of advanced scientific research Risk management in digital production	PD CCH	5	150	2/0/1	105	E		5		
MSM211 MSM216	Digital systems of machine-building production Additive Manufacturing operating systems	PD CCH	5	150	2/0/1	105	E			5	
UND225 IND229	Occupational health and safety of digital engineering production Production planning and control	PD CCH	5	150	2/0/1	105	E			5	
M-3. Practice-oriented module											
AAP229	Pedagogical practice	BD UC	6						6		
AAP236	Research practice	PD UC	4								4
M-4. Experimental research module											
AAP251	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	2					2			
AAP241	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	3						3		
AAP254	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	5							5	
AAP255	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	14								14
M-5. Module of final attestation											
ECA205	Preparation and defense of a master's thesis	FA	12								12
	Total based on UNIVERSITY:							30	30	30	30

Number of credits for the entire period of study					
Cycle code	Cycles of disciplines	Credits			
			university component (UC)	component of choice (CCH)	Total
BD	Cycle of base disciplines		20	15	35
PD	Cycle of profile disciplines		25	24	49
	Total for theoretical training:	*0*	*45*	*39*	*84*
	RWMS				*24*
FA	Final attestation	12			12
	TOTAL:	12	45	39	120

Decision of the Academic Council of Kaznitu named after K.Satpayev. Protocol №13 от "28" 04 2022 г.

Decision of the Educational and Methodological Council of Kaznitu named after K.Satpayev. Protocol №7 от "26" 04 2022г.

Decision of the Academic Council of the Institute E&ME. Protocol № 5 от "20" 04 2022г.

Vice-Rector for Academic Affairs _____ B.A. Zhautikov

E&ME Institute Director _____ K.Yelemessov

ME,SC&M Department Head _____ M.Issametova

Representative of the Council for EP from Employers _____ I. Dyusebaev