Institute of Architecture and Construction named after T.K. Basenov

Department of "Engineering systems and networks"

EDUCATIONAL PROGRAM
7M07304 "Engineering systems and networks"

Code and classification of the field of education: **7M07 Engineering, manufacturing and civil engineering**
Code and classification of training directions: **7M073 Architecture and civil engineering**
Group of educational programs: **M127 Engineering systems and networks**
Level based on NQF: 7
Level based on IQF: 7
Study period: 2 years
Amount of credits: 120

Almaty 2022

Educational program 7M07304 "Engineering systems and networks" 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 7M07304 «Engineering systems and networks» was developed by Academic committee based on direction «Architecture and civil engineering».

Full name	Academic degree/ academic title	Position	Workplace	Signature
Chairperson of Academic Committee:				
Alimova Kulyash Kabpasovna	Candidate of Technical Sciences	Head of the Department, associate professor	Department of "Engineering systems and networks", Institute of Architecture and Construction named after T.K. Basenov	
Teaching staff:				
Khalkhabai Bostandyk	Candidate of Technical Sciences, docent	Associate professor	Department of "Engineering systems and networks"	
Khoishiev Amirkhan Nurdinuly	Candidate of Technical Sciences	Associate professor	Department of "Engineering systems and networks"	
Employers:				
Zhumartova Aliya Yelshibekovna		Director	LLP "SRC Ekozhobalau"	
Students				
Shalkar Saken Satbayuly		master's student	1 course	
Bayarystanov Madiyar Malikovich		student	4 course	

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List of abbreviations and designations

NJSC KazNRTU named after K.I.Satbayev - Non-profit Joint Stock Company "Kazakh National Research Technical University named after K.I.Satpayev";
SCSE – State compulsory standard of education of the Republic of Kazakhstan;
EP – educational program;
SIS – student independent study (student, master student, doctoral student);
TSIS – independent work of a student with a teacher (student, master student, doctoral student) ;
WC – working curriculum;
CED – catalog of elective disciplines;
UC – university component;
CC – component of choice;
NQF – national qualifications framework;
IQF– industry qualifications framework;
LO – learning outcomes.

1. Description of educational program

Within the framework of the Master's degree specialty, the university independently develops various educational programs in accordance with the National Qualification Framework, professional standards and agreed with the Dublin descriptors and the European Qualification Framework.

Educational programs should be focused on learning outcomes.

Dublin descriptors, which are a description of the level and scope of knowledge, skills, skills and competencies acquired by undergraduates upon completion of the educational program of each level (stage) of higher and postgraduate education, are based on learning outcomes, formed competencies, as well as the total number of ECTS credit (credit) units. The structure of the Master's degree program is formed from various types of educational and scientific work that determine the content of education, and reflects their relationship, measurement and accounting.

The purpose of the educational program is to achieve the provision of high-quality educational services in the field of postgraduate education, leadership in the national training space in the specialty 7M07304 "Engineering systems and networks" through the implementation of the principles of the Bologna Process and modern quality standards.

The objective of the educational program is to train highly qualified competent specialists in the construction and engineering sector of the economy of the Republic of Kazakhstan, who are able to quickly adapt to rapidly changing market conditions and innovative trends.

The list of elective component disciplines is determined by the university independently. This takes into account the expectations of employers and the needs of the labor market. Masters of the specialty 7M07304 "Engineering systems and networks" can perform the following types of professional activities:

- Settlement and design and technical and economic;
- organizational and managerial;
- production, technological and operational;
- legal, expert and consulting - research;
- educational (pedagogical).

Specific types of activities are determined by the content of the educational and professional program developed by the university. Organizational and managerial activities:

- organization of the work of the labor collective of performers with the creation of the necessary conditions, equipping (providing) production with labor and material resources, making optimal management decisions in various production conditions;

- finding optimal solutions in the event of labor disputes over staffing, wages, cost and quality of performance of various types of work, ensuring life safety, labor protection and compliance with environmental safety in production areas;

- assessment of production and non-production costs to ensure the quality of products of construction and repair production;

- implementation of technical control and quality management in transport construction.

Production, technological and operational activities:

-planning and solving technological problems encountered in the production process;

- efficient use of materials and raw materials, equipment, machinery, modern computer programs for calculations and design of technological process parameters;

- engineering and technical operation of buildings and structures of industrial and civil construction or engineering systems.

Scientific, experimental and research activities:

- implementation of fundamental and applied scientific research in the study of engineering systems;

- creation of new production technologies;

- implementation of experimental design developments;

- production of analysis of the state and dynamics of objects of activity using modern methods and methods;

- production of scientifically based experimental studies of engineering systems;

Legal, expert and consulting activities:

- possession of basic knowledge in the field of civil, financial, commercial and other branches of law;

- the ability to navigate the current legislation and the ability to apply certain legal norms in practice;

- conducting expertise and providing consulting assistance in various production situations.

Educational (pedagogical) activity:

- knowledge of the functions of teaching courses in basic disciplines, technology, organization, planning and management of engineering systems, performing academic work as a teacher (teacher) in institutions of secondary and vocational education (schools, gymnasiums, lyceums, colleges).

2. Purpose and objectives of educational program

Purpose of EP: The purpose of the educational program is to achieve the provision of high quality educational services in the field of postgraduate education, leadership in the national space for training personnel under the educational program 7M07304 "Engineering Systems and Networks" (scientific and pedagogical direction) through the implementation of the principles of the Bologna process and modern quality standards.

Tasks of EP: training of highly qualified competent specialists in the construction and engineering sector of the economy of the Republic of Kazakhstan, able to quickly adapt to rapidly changing market conditions and innovative trends.

The list of elective component disciplines is determined by the university independently. This takes into account the expectations of employers and the needs of the labor market.

3. Requirements for evaluating the educational program learning outcomes

A graduate who has mastered master's degree programs should have the following general professional competencies:
– the ability to independently acquire, comprehend, structure and use new knowledge and skills in professional activities, develop their innovative abilities;
– the ability to formulate research goals independently, establish the sequence of solving professional tasks;
– the ability to apply in practice the knowledge of fundamental and applied sections of disciplines that determine the orientation (profile) of the master's degree program;
– the ability to professionally choose and creatively use modern scientific and technical equipment to solve scientific and practical problems;
– the ability to critically analyze, present, defend, discuss and disseminate the results of their professional activities;
– proficiency in the preparation and execution of scientific and technical documentation, scientific reports, reviews, reports and articles;
– willingness to lead a team in the field of their professional activities, tolerantly perceiving social, ethnic, confessional and cultural differences;
– willingness to communicate orally and in writing in a foreign language to solve the tasks of professional activity.

A graduate who has mastered the master's degree program must have professional competencies corresponding to the types of professional activities that the master's degree program is focused on:
research activities:
– the ability to form diagnostic solutions to professional problems by integrating the fundamental sections of sciences and specialized knowledge obtained during the development of the master's degree program;
– the ability to independently conduct scientific experiments and research in the professional field, generalize and analyze experimental information, draw conclusions, formulate conclusions and recommendations;
– the ability to create and explore models of the studied objects based on the use of in-depth theoretical and practical knowledge in the field of engineering systems of buildings and structures;
– scientific and production activities:
– the ability to independently carry out production and scientific field, laboratory and interpretive work in solving practical problems;
– the ability to professionally operate modern field and laboratory equipment and devices in the field of the master's degree program;
– the ability to use modern methods of processing and interpreting complex information to solve production problems; – project activities:
– the ability to independently draw up and submit projects of scientific research and scientific production works;
– readiness to design complex research and scientific-production works in solving professional tasks;

– *organizational and managerial activities:*
– readiness to use practical skills in organizing and managing research and scientific-production works in solving professional tasks;
– readiness for the practical use of regulatory documents in the planning and organization of scientific and production work;
– scientific and pedagogical activity:
– the ability to conduct seminars, laboratory and practical classes;
– the ability to participate in the management of scientific and educational work of students in the field of engineering systems of buildings and structures. When developing a master's degree program, all general cultural and general professional competencies, as well as professional competencies related to those types of professional activities that the master's program is focused on, are included in the set of required results of mastering the master's program.

4. Passport of educational program

4.1. General information

№	Field name	Comments
1	Code and classification of the field of education	7M07 Engineering, manufacturing and civil engineering
2	Code and classification of training directions	7M073 Architecture and civil engineering
3	Educational program group	M127 Engineering systems and networks
4	Educational program name	7M07304 Engineering systems and networks
5	Short description of educational program	Within the framework of the Master's degree specialty, the university independently develops various educational programs in accordance with the National Qualification Framework, professional standards and agreed with the Dublin descriptors and the European Qualification Framework. Educational programs should be focused on learning outcomes. Dublin descriptors, which are a description of the level and scope of knowledge, skills, skills and competencies acquired by undergraduates upon completion of the educational program of each level (stage) of higher and postgraduate education, are based on learning outcomes, formed competencies, as well as the total number of ECTS credit (credit) units. The structure of the Master's degree program is formed from various types of educational and scientific work that determine the content of education, and reflects their relationship, measurement and accounting. ıe purpose of the educational program is to achieve the provision of high quality educational services in the field of postgraduate education, leadership in the national space for training personnel under the educational program 7M07304 "Engineering Systems and Networks" (scientific and pedagogical direction) through the implementation of the principles of the Bologna process and modern quality standards.
6	Purpose of EP	The purpose of the educational program is to achieve the provision of high quality educational services in the field of postgraduate education, leadership in the national space for training personnel under the educational program 7M07304 "Engineering Systems and Networks" (scientific and pedagogical direction) through the implementation of the principles of the Bologna process and modern quality standards.
7	Type of EP	New
8	The level based on NQF	7

9	The level based on IQF	7
10	Distinctive features of EP	no
11	List of competencies of educational program	General professional; Professional (research activities, organizational and managerial activities, scientific and production activities, project activities, scientific and pedagogical activity);
12	Learning outcomes of educational program	LO1 Use the acquired knowledge for the original development and application of ideas in the context of scientific research. LO2 Critically analyze existing concepts, theories and approaches to the analysis of processes and phenomena. LO 3 Integrate knowledge gained in different disciplines to solve research problems in new unfamiliar conditions. LO 4 By integrating knowledge, make judgments and make decisions based on incomplete or limited information. LO 5 Apply the knowledge of pedagogy and psychology of higher education in their teaching activities. LO 6 Apply interactive teaching methods. LO 7 To carry out information-analytical and information-bibliographic work with the involvement of modern information technologies. LO 8 Think inventively and creatively to solve new problems and situations. LO 9 Be fluent in a foreign language at a professional level, allowing to conduct research and teach special subjects in universities. LO 10 Summarize the results of research and analytical work in the form of a dissertation, scientific article, report, analytical note and other materials.
13	Education form	Full - time
14	Period of training	2
15	Amount of credits	120
16	Languages of instruction	Kazakh, Russian
17	Academic degree awarded	Master of Technical Sciences
18	Developer(s) and authors	Alimova K., Khoishiev A., Tlesh D.

4.2. Relationship between the achievability of the formed learning outcomes based on educational program and academic disciplines

№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)									
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CYCLE OF BASIC DISCIPLINES University component													
1	English language (professional)	The course is designed for master students of technical specialties for improvement and development of foreign language communication skills in the professional and academic spheres. The course introduces students the general principles of professional and academic intercultural oral and written communication using modern pedagogical technologies (round table, debates, discussions, analysis of professionally oriented cases, projecting).	5	v			v	v				v	
2	Psychology of management	Psychology of management is a section of psychology that studies the psychological patterns of managerial activity. The main task of psychology management is the analysis of psychological conditions and management features in order to improve the efficiency and quality of work in the management system.	3		v	v	v			v			
3	History and philosophy of science	The purpose of studying the discipline is to form undergraduates' in–depth knowledge about the stages of development of the history and philosophy of science, the place and role of scientific knowledge, cognitive models, principles and methods of scientific knowledge. Studying the course allows you to reveal the connection between philosophy and science, highlight the philosophical problems of science and scientific cognition, the main stages of the history of science, the leading concepts of philosophy of science, modern problems of the development of scientific and technical reality.	3		v			v			v		v
4	Higher school pedagogy	The course is intended for undergraduates of the scientific and pedagogical magistracy of all specialties. As part of the course, undergraduates will master the methodological and theoretical foundations of higher school pedagogy, learn how	3		v	v		v			v		

		to use modern pedagogical technologies, plan and organize the processes of teaching and upbringing, master the communicative technologies of subject-subject interaction between a teacher and a student in the educational process of a university.											
5	Pedagogical practice	Pedagogical practice is conducted in order to form practical skills of teaching and learning methods. At the same time, undergraduates are involved in conducting undergraduate classes at the discretion of the faculty	6	v		v					v		
CYCLE OF BASIC DISCIPLINES Component of choice													
6	Innovative technologies for natural and waste water treatment	In the process of studying the discipline, future specialists are preparing to solve problems of natural water purification, neutralization, reuse of wastewater and their release into reservoirs.	**5**			v	v		v		v		
7	Methods for optimizing the parameters of heat and gas supply systems and heat generating plants	In the process of studying the discipline, undergraduates should have an idea of the current state of heat-consuming systems and gain knowledge on how to solve problems in heat and gas supply systems, ventilation and heat-generating installations, as well as control the processes of heat generation in heat sources.	**5**	v		v	v						v
8	Modern technologies and equipment of water supply and sewerage systems	In the process of studying the discipline, future specialists are preparing to solve the problems of using modern technologies for the purification of natural and waste waters, neutralization, reuse of waste waters and their release into reservoirs, as well as the use of modern equipment.	**5**	v	v		v				v		v
9	Heat generators and autonomous heat supply of buildings	Heat generators and autonomous heat supply of buildings. In the process of studying the discipline, undergraduates should have an idea of the current state of engineering systems of buildings; methods of calculating the heat loads on the heating, ventilation and hot water supply systems of buildings; with types, schemes and principles of action of generators of heat.	**5**			v	v				v		v
10	Innovative design solutions for water supply and sewerage systems and structures	Innovative design solutions for water supply and sewerage systems and structures. In the process of studying the discipline, future specialists are preparing to solve the problems of using innovative technologies for the purification	**5**	v			v		v		v		

		of natural waters, decontamination, reuse of wastewater and their release into reservoirs.											
11	Effective environmental protection technologies in heat and gas supply and ventilation systems	As a result of studying the discipline, undergraduates should know: the nature of the impact of pollutants on the biosphere; the structure of the atmosphere; basic concepts of the theory of turbulence and turbulent diffusion in a stratified atmosphere; method for determining the hydrodynamic and thermal rise of the jet ejection; principles of rationing of air quality; classification of pollutant emission sources; methodology for calculating gross emissions of pollutants and fields of their surface concentrations; methods for determining the maximum permissible emissions;	**5**	**v**		**v**	**v**						**v**
CYCLE OF PROFILE DISCIPLINES University component													
12	Methods for calculating the energy efficiency of buildings and structures	Methods for calculating the energy efficiency of buildings and structures. It gives an idea about energy resources and the principles of their economy, energy saving methods in heat generating plants, heating and ventilation systems, the principles of underground coal gasification, the use of renewable energy resources, energy technology waste use and energy production at nuclear power plants.	**5**	**v**		**v**					**v**		
13	Means and methods of experimental research	Means and methods of experimental research. Inspection of building structures, buildings and structures. Methodology of experimental research. Methods and means of measurement in an engineering experiment. Inspection of the state of structures and structures. Tests of structures, buildings and structures. General concepts of structural modeling. Methods and means of experimental studies of the state of various construction sites. Technique of the experiment. The plan (program) of the experiment. Methods of scientific research.	**5**			**v**	**v**				**v**		**v**
14	Research practice	The research practice of the undergraduate is conducted in order to familiarize himself with the latest theoretical, methodological and technological achievements of domestic and foreign science, modern methods of scientific research, processing and interpretation of experimental data.	**6**	**v**	**v**	**v**							

CYCLE OF PROFILE DISCIPLINES Component of choice												
15	Actual problems of modern water supply and sewerage systems	The discipline studies the actual problems of modern water supply and sewerage systems. The issues related to the increased requirements for natural and wastewater treatment systems are being studied, as well as issues of increasing the load on treatment facilities that arise due to an increase in their productivity.	**5**		**v**		**v**		**v**		**v**		
16	Topical problems of modern heat and gas supply and ventilation systems	The discipline studies the actual problems of modern heat and gas supply and ventilation systems, the tasks of providing an expanded outlook, the possibility of deeper improvement of specialized issues of professional activity in the field of heat and gas supply and ventilation.	**5**		**V**		**V**		**V**		**V**		
17	Start-up and adjustment of water supply and sewerage facilities	The discipline "Commissioning and commissioning of water supply and sewerage facilities" studies the rules for commissioning and commissioning of facilities, highlights the issues of monitoring the operation of facilities and their technical characteristics.	**5**	**V**		**V**	**V**						**V**
18	Rational use of heat and gas in construction	The purpose of teaching the discipline is to acquire the knowledge and practical skills necessary to understand the rational use of heat and gas during construction, gas fuel supply systems, ensure uninterrupted gas supply and heat supply, taking into account the operation of the main and auxiliary equipment, rational consumption of gas fuel based on the use of modern science and technology, taking into account the development prospects of the gas industry and heat supply systems	**5**	**V**		**V**			**V**				**V**
19	Systems of protection of water resources	The purpose of the discipline is to study the concepts and principles of water use, protection of water resources, the study of methods of protection of water resources, in order to preserve the qualitative and quantitative composition of water resources.	**5**		**V**	**V**					**V**		
20	The economy of heat and energy in heat and gas supply and ventilation systems	The economy of heat and energy in heat and gas supply and ventilation systems. Methods of saving heat and energy in boiler plants, heating, ventilation, air conditioning and cooling systems, the device and the principle of operation of systems using solar and geothermal energy for the heat supply of	**5**	**v**	**v**					**v**			**v**

		domestic and industrial consumers and methods for assessing the effectiveness of energy-saving measures.											
21	Modern computer calculations of heat supply, gas supply and ventilation systems	In the process of studying the discipline, future specialists are preparing to solve problems on computers of heat and gas supply and ventilation systems, taking into account the modern achievements of various areas. It serves as the basis for preparing the undergraduate to master the elements of the methodology of scientific research, contributes to the development of creative thinking; organization of the optimal mental activity of the future undergraduate in the field of heat and gas supply and ventilation.	**5**						**v**	**v**			**v**
22	Modern computer calculations of water supply and sewerage systems	In the course of studying the discipline, masters study modern computational computer programs and modeling of processes and structures, in order to effectively select equipment and structures.	**5**						**v**	**v**			**v**
23	Modern methods modernization of water treatment facilities	The purpose of teaching the discipline is to form a set of knowledge and skills on the use of methods for modernizing water treatment facilities in the context of increasing the productivity of treatment facilities associated with population growth and industrial development.	**5**	**v**						**v**			**v**
24	Adjustment and reconstruction of heat supply systems	Adjustment and reconstruction of heat supply systems. The basic decisions on reconstruction of modern systems of a heat supply. Adjustment and operation of city and industrial systems of a heat supply. Techniques of hydraulic calculations of thermal networks. The thermal and pump equipment in heat supply systems. Working out пьезометрических schedules with pump stations. Requirements to hydraulic modes at operation of systems of a heat supply. Reliability bases at operation of systems of a heat supply. Hydraulic stability of systems of a heat supply. Modern technologies designing of installation of systems of a heat supply.	**5**	**v**		**v**					**v**		**v**
25	Actual problems of operation of modern systems of heat supply, gas supply and ventilation	In the course of studying the discipline, undergraduates should receive information about the current state of housing and communal services; about the management of the municipal sector of cities and settlements; about methods of reducing heat losses and monitoring the effective use of heat in heat and gas supply and ventilation systems; about the rules	**5**	**v**	**v**		**v**						**v**

		of operation of internal engineering systems and external networks											
26	Actual problems of operation of modern water supply and sewerage systems	In the process of studying the discipline, specialists solve problems in conditions of increasing regulatory requirements for purified water of water supply and sewerage systems, in order to determine effective technological parameters of system equipment and save resources in operation.	**5**	**v**		**v**					**v**		**v**
27	Retechnologization of wastewater treatment facilities	The purpose of the discipline is to study the issues of retechnologization of wastewater treatment plants, the latest technologies, innovative methods of wastewater treatment, as well as the acquisition of skills in the selection of improved equipment for industrial wastewater treatment.	**5**		**v**				**v**		**v**		**v**
28	Rational use of energy resources	The rational use of energy resources studies energy conservation (energy saving) - the implementation of legal, organizational, scientific, industrial, technical and economic measures aimed at the efficient (rational) use (and economical use) of fuel and energy resources and the involvement of renewable sources in the economic turnover.	**5**			**v**			**v**		**v**		**v**

5. Curriculum of educational program

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

SATBAYEV UNIVERSITY

APPROVED
Chairman of the Management Board-
Rector of KazNRTU named after K.Satbayev
M.M. Begentaev
"26" 04 2022 y.

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

Educational program 7M07304 - "Engineering systems and networks"
Group of educational programs M127 - "Engineering systems and networks"

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. Module of basic training (university component)											
LNG210	English language (professional)	BD UC	5	150	0/0/3	105	E	5			
HUM214	Psychology of management	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			
M-2. Module of technology (component of choice)											
HYD280	Innovative technologies for natural and waste water treatment	BD CCH	5	150	2/0/1	105	E	5			
HYD282	Methods for optimizing the parameters of heat and gas supply systems and heat generating plants										
HYD283	Modern technologies and equipment of water supply and sewerage systems	BD CCH	5	150	2/0/1	105	E	5			
HYD284	Heat generators and autonomous heat supply of buildings										
HYD288	Innovative design solutions for water supply and sewerage systems and structures	BD CCH	5	150	2/0/1	105	E		5		
HYD289	Effective environmental protection technologies in heat and gas supply and ventilation systems										
CYCLE OF PROFILE DISCIPLINES (PD)											
M-3. Module of scientific and methodological training (university component)											
HYD279	Methods for calculating the energy efficiency of buildings and structures	PD UC	5	150	2/0/1	105	E	5			
HYD701	Means and methods of experimental research	PD UC	5	150	2/0/1	105	E		5		
M-4. Module of engineering systems and structures (component of choice)											
HYD285	Actual problems of modern water supply and sewerage systems	PD CCH	5	150	2/0/1	105	E	5			
HYD286	Topical problems of modern heat and gas supply and ventilation systems										
HYD290	Start-up and adjustment of water supply and sewerage facilities	PD CCH	5	150	2/0/1	105	E		5		
HYD291	Rational use of heat and gas in construction										
HYD293	Systems of protection of water resources	PD CCH	5	150	2/0/1	105	E			5	
HYD294	The economy of heat and energy in heat and gas supply and ventilation systems										
HYD296	Modern computer calculations of heat supply, gas supply and ventilation systems	PD CCH	5	150	2/0/1	105	E			5	
HYD295	Modern computer calculations of water supply and sewerage systems										
HYD297	Modern methods modernization of water treatment facilities	PD CCH	5	150	2/0/1	105	E			5	
HYD298	Adjustment and reconstruction of heat supply systems										

HYD299	Actual problems of operation of modern systems of heat supply, gas supply and ventilation	PD CCH	5	150	2/0/1	105	E			5	
HYD287	Actual problems of operation of modern water supply and sewerage systems										
HYD700	Retechnologization of wastewater treatment facilities	PD CCH	5	150	2/0/1	105	E			5	
HYD292	Rational use of energy resources										
M-5. Practice-oriented module											
AAP229	Pedagogical practice	BD UC	6						6		
AAP256	Research practice	PD UC	4								4
M-6. 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-7. Module of final attestation											
ECA205	Registration and protection of the master thesis	FA	12								12
	Total based on UNIVERSITY:							30	30	30	30
								60		60	

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 basic disciplines		20	15	35
PD	Cycle of profile disciplines		14	35	49
	Total for theoretical training:	0	34	50	84
	RWMS				24
FA	Final attestation	12			12
	TOTAL:	12	34	50	120

Decision of the Academic Council of KazNRTU named after K.Satbayev. Protocol № 13 "28" 04 2022

Decision of the Educational and Methodological Council of KazNRTU named after K.Satbayev. Protocol № 7 "26" 04 2022

Decision of the Academic Council of the Institute_____. Protocol № 5 "28" 04 2022

Vice-Rector for Academic Affairs — B. Zhautikov

Dean of the Institute of A&C — B. Kuspangaliev

Head of the department "Engineering systems and networks" — K. Alimova

Representative of the Council of Employers Head of "Ecojobulau" LLP — A. Zhumartova