



**Institute of Automation and Information Technologies
Department "Automation and control"**

**EDUCATIONAL PROGRAM
7M07101 - AUTOMATION AND ROBOTIZATION**
code and name of the educational program

Code and classification of the field of education: **7M07 Engineering, manufacturing and construction industries**

Code and classification of areas of study: **7M071 Engineering and Engineering**

Group of educational programs: **M100 Automation and control**

NQF level: **7**

ORC level: **7**

Duration of study: **2 years**

Volume of credits: **120 credits**

Almaty 2022






The educational program "**7M07101 - Automation and robotization**" was approved at a meeting of the Academic Council of KazNRTU named after K.I.Satpayev.

Protocol №13 dated April 28, 2022

Considered and recommended for approval at a meeting of the Educational and Methodological Council of KazNRTU named after K.I. Satpayev.

Protocol № 7 dated April 26, 2022

The educational program "7M07101 - Automation and robotization" was developed by the academic committee in the direction "7M071 - Engineering".

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List of abbreviations and symbols

EP	Educational program
LSU	Microprocessor control systems
TP	Teaching practice
IP	Research practice
RFP	Application package

1. Description of the educational program

The educational program (hereinafter EP) is a set of documents developed by the Kazakh National Research Technical University named after K.I.Satpayev and approved by the Ministry of Education and Science of the Republic of Kazakhstan.

Educational program 7M07101 - Automation and robotics involves the training of highly qualified specialists in the field of automation, robotics, artificial intelligence and automated control.

The bachelor's degree in the EP "Automation and robotization" provides for the acquisition of competencies in a wider area: automation, robotics, artificial intelligence and automated control in order to ensure the adaptation of bachelor's graduates to the requirements of the labor market. This EP of the master's program provides for further deepening of the competencies acquired in the bachelor's degree. In this connection, modern innovative disciplines have been introduced into the program.

In the process of mastering the educational program, the Master of Technical Sciences in the field of automation of production processes must acquire the following key competencies:

- will be able to analyze literature data and, on the basis of the analysis, determine and experimentally implement possible ways to modernize automated and robotic systems using new technical solutions.
- will be able to apply appropriate methods of analysis, both qualitative and quantitative, to collect and integrate information in the best possible way.
- demonstrate the skills of teaching in the undergraduate program, working with students and supervising them.
- will be able to conduct independent original research that contributes to the development of science, in accordance with the best practices and industry standards.
- have the skills to create robotic systems and automated technological complexes.
- have professional knowledge in the field of automation, robotization, artificial intelligence and automated control.

Objects of professional activity:

- automation and process control systems;
- robotic systems and complexes;
- teaching college and undergraduate students in special disciplines.

The Master in Automation of Production Processes must solve the following tasks in accordance with the types of professional activity:

in the field of production and technological activities:

- to be a leading engineer, a leading specialist of the production unit for the operation, maintenance, repair and adjustment of technical means of automated control systems for production processes in various industries;

in the field of organizational and managerial activities:

- to be the head of the department for the maintenance and repair of elements,

devices of automated control systems for production processes in various industries;
in the field of experimental research activities:

- to be a leading specialist in conducting experimental studies of industrial automation objects;

in the field of research and teaching activities:

- be a researcher in a scientific laboratory for the research and development of modern automated control systems for production processes in various industries;

- be an undergraduate teacher in special disciplines in the field of automation and robotics;

in the field of design activities:

- be a leading engineer or chief engineer of a project for the development and design of automated control systems for production processes in various industries.

2. Purpose and objectives of the educational program

Purpose of the EP: The purpose of the educational program is to train undergraduates in basic and specialized disciplines with the achievement of relevant competencies.

Tasks of the EP:

Based on the achievements of modern science, technology and production, to provide knowledge and skills in the field of:

- automation;

- robotics;

- artificial intelligence;

- automated control.

3. Requirements for evaluating the learning outcomes of an educational program

EP 7MO7101 - "Automation and robotization" ensures that all students achieve the learning outcomes necessary for professional activities. At the end of the program, the student must:

- possess the skills of conducting research and design work on the development of automated process control systems and robotic technological complexes in various industries.

- to freely use the state, Russian and one of the common, foreign languages in professional activities. Be fluent in the basics of philosophical, pedagogical, economic knowledge.

- master the basic methods: data mining, descriptive analysis, correlation and regression analysis, classical calculus of variations, matrix description of spatial mechanisms.

- master the basic methods of modern control theory: synthesis of systems with given dynamics using standard and relay controllers, digital control systems, systems with a variable structure, modal control, identification and adaptation of

optimal control.

- have the skills to describe the kinematics and dynamics of industrial robots, methods for developing software trajectories, developing adaptive and non-adaptive control algorithms for industrial robots.

- have the skills to create automated process control systems and robotic technological complexes.

- have the skills to build microprocessor systems (MCS). To be able to design hardware and software of LSU.

- know modern technical means of automation and robotics. Own the basics of the practical application of modern technical means of automation.

- master the skills of programmatic and stabilizing, optimal and adaptive control and synthesis of intelligent control systems.

- the ability to design modern and reliable blocks and devices, intelligently controlled executive, information-sensor and navigation modules of robotic and automated systems.

4. Passport of the educational program

4.1. General information

No.	Field name	Note
1	Code and classification of the field of education	7M07 Engineering, manufacturing and construction industries
2	Code and classification of areas of study	7M071 Engineering and Engineering
3	Group of educational programs	M100 Automation and control
4	Name of the educational program	7M07101 - Automation and robotization
5	Brief description of the educational program	Educational program 7M07101 - Automation and robotics involves the training of highly qualified specialists in the field of automation, robotics, artificial intelligence and automated control.
6	Purpose of the OP	The purpose of the educational program is to train undergraduates in basic and specialized disciplines with the achievement of relevant competencies.
7	OP type	New EP
8	NQF level	7
9	ORC level	7
10	Distinctive features of the OP	No
11	List of competencies of the educational program:	<p>In the process of mastering the educational program, the Master of Technical Sciences in the field of automation of production processes must acquire the following key competencies:</p> <ul style="list-style-type: none"> - will be able to analyze literature data and, on the basis of the analysis, determine and experimentally implement possible ways to modernize automated and robotic systems using new technical solutions. - will be able to apply appropriate methods of analysis, both qualitative and quantitative, to collect and integrate information in the best possible way. - demonstrate the skills of teaching in the undergraduate program, working with students and supervising them. - will be able to conduct independent original research that contributes to the development of science, in accordance with the best practices and industry standards. - have the skills to create robotic systems and automated technological complexes. - have professional knowledge in the field of automation, robotization, artificial intelligence and automated control.
12	Learning outcomes of the educational program:	<p>PO1 Bhave the skills to conduct research and design work on the development of automated process control systems and robotic technological complexes in various industries.</p> <p>PO2Freely use in professional activities the state, Russian and one of the most common, foreign languages. Be fluent in the basics of philosophical, pedagogical, economic knowledge.</p>

		<p>PO3 Master the basic methods: data mining, descriptive analysis, correlation and regression analysis, classical calculus of variations, matrix description of spatial mechanisms.</p> <p>PO4 Master the basic methods of modern control theory: synthesis of systems with given dynamics using standard and relay controllers, digital control systems, systems with a variable structure, modal control, identification and adaptation of optimal control.</p> <p>PO5 Have the skills to describe the kinematics and dynamics of industrial robots, methods for developing software trajectories, developing adaptive and non-adaptive control algorithms for industrial robots.</p> <p>PO6 Have the skills to create automated process control systems and robotic technological complexes.</p> <p>PO7 Possess the skills of building microprocessor systems (MCS). To be able to design hardware and software of LSU.</p> <p>PO8 Knowledge of modern technical means of automation and robotics. Own the basics of the practical application of modern technical means of automation.</p> <p>PO9 master the skills of programmatic and stabilizing, optimal and adaptive control and synthesis of intelligent control systems.</p> <p>PO10 the ability to design modern and reliable blocks and devices, intelligently controlled executive, information-sensor and navigation modules of robotic and automated systems.</p>
13	Form of study	full-time
14	Training period	2 years
15	Volume of loans	120 credits
16	Languages of instruction	Kazakh, Russian
17	Awarded Academic Degree	Master of Engineering
18	Developer(s) and authors:	Aldiyarov N.U., Zhanabaeva E.Zh.

4.2. The relationship between the achievability of the formed learning outcomes in the educational program and academic disciplines

No.	Name of the discipline	Brief description of the discipline	Amount of credits	Formed learning outcomes (codes)											
				LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10		
Cycle of basic disciplines															
University component															
1	English (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 (round table, debates, discussions, analysis of professionally oriented cases, design). The course ends with a final exam. Undergraduates also need to study independently (MIS).	5		v										
2	Psychology of management	The course is aimed at teaching undergraduates the basics of management psychology. It will consider the specifics of management psychology, psychological patterns of management activities, personality and its potential in the management system; motivation and performance in the organization, leadership and leadership in modern management of organizations, a social group as an object of management, the psychological basis for making managerial decisions, business communication and managerial conflicts, the psychology of responsibility, creating an image as an integral part of the culture of communication, the psychology of advertising.	3		v										
3	History and philosophy of science	The subject of philosophy of science, the dynamics of science, the specifics of science, science and prescience, antiquity and the formation of theoretical science, the main stages of the historical development of science, the features of classical science, non-classical and post-non-classical science, the philosophy of mathematics, physics, engineering and technology, the specificity of engineering sciences, the ethics of science, social and moral responsibility of a scientist and engineer.	3		v										
4	Pedagogy of higher education	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 education pedagogy, learn how to use modern pedagogical technologies, plan and organize training and education	3		v										

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		processes, master the communication technologies of subject-subject interaction between a teacher and a master student in the educational process of the university. Also undergraduates will study human resource management in educational organizations (on the example of higher education).												
5	Teaching practice	<p>Pedagogical practice (TP) is the most important component and integral part of the educational process of undergraduates. The purpose of the PP is the general professional preparation of undergraduates for teaching at the university.</p> <p>The objectives of the pedagogical practice of undergraduates are strengthening the knowledge, skills and abilities acquired by undergraduates in the process of studying the disciplines of the master's program.</p> <p>Pedagogical practice is carried out at the graduating department, which trains masters. The terms and duration of the practice are established in accordance with the curricula and the calendar schedule of the educational process. During the period of internship, undergraduates are subject to the internal regulations of the university.</p>	6	✓										
Cycle of basic disciplines Selectable Component														
6	Modern control theory	The content of the discipline includes the study of modern approaches to the analysis and synthesis of automatic control systems based on the methodology of the "state space". The properties of linear and nonlinear systems and methods of their study are considered from the unified positions of the state space method. Basic information about systems with variable structure, modal control, identification, adaptation and optimization in control systems is given.	5				✓							
7	Integrated automation and control technologies	The task of studying the discipline is to acquire knowledge on effective technologies for modeling automation objects, study directions for the development of automation tools, fundamentally new methods of process control, computer-integrated production of a new generation, as well as the acquisition of skills in the formation of a production automation strategy, the use of modern automation devices to solve control problems, the formation of sets of modern sensors and transducers to combine them into a system of computer-integrated production.	5						✓	✓				
8	Data Mining Methods	The discipline considers the most common methods and algorithms of data mining. Particular attention is paid to understanding the principles and concepts underlying modern intellectual methods. On practical examples, the features of data analysis during research in the field of automation and control are considered.	5			✓								

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9	Intelligent technologies in robotics	The course "Intelligent Technologies in Robotics" discusses the main characteristics of robots: load capacity, coordinate movement system, number of degrees of freedom; speed of movement and the magnitude of the stroke of each link, positioning error, method of installation at the workplace, working area of service. Classification and principles of construction of robotic systems. Technological requirements for robotic systems used in enterprises. An actively developing field of artificial intelligence. Includes models, methods and algorithms focused on automatic accumulation and formation of knowledge based on data analysis and generalization. Includes learning by example (or inductive) as well as traditional approaches from the theory of pattern recognition.	5			✓							
10	Optimum control of automation objects	The discipline studies the main features and characteristics of industrial automation objects. Requirements for the optimal control system, requirements for the optimal control method; statement of the optimal control problem, formalization of the extremal problem, algorithms based on solving auxiliary problems, iterative algorithms, linear programming, optimal control of multistage processes, classical variational methods of optimal control, application of the maximum principle to solve the optimal control problem.	5									✓	
11	MES systems	The course "MES-systems" deals with the collection and storage of data, the interaction of information subsystems in order to receive, accumulate and transmit technological and control data circulating in the production environment of the enterprise; product quality management, analysis of product quality measurement data; production process control, production process monitoring, automatic adjustment or interactive support for operator decisions, maintenance and repair management.	5	✓		✓							
Cycle of major disciplines University component													
12	Automation of technical systems	The content of the discipline includes the characterization of qualitative and quantitative indicators of the reliability of control system elements, their probabilistic and statistical assessment based on test results, the study of the main methods for calculating the reliability of recoverable and non-recoverable systems, analysis of the need and selection of the redundancy ratio. Training of specialists for independent solution of theoretical and applied problems related to the assessment, analysis and ensuring the reliability of control systems and their elements.	5						✓		✓		
13	Research practice	Research practice (IP) is a form of professional training of undergraduates for scientific and pedagogical activities, which is a	four	✓									

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		<p>type of practical activity of undergraduates related to conducting scientific research within the framework of the chosen topic of the dissertation work, preparing scientific publications, final scientific qualification work (dissertation) and her subsequent defense.</p> <p>Research practice is a component of the main professional educational programs of the master's program.</p> <p>The purpose of the research practice is to develop the skills and abilities of undergraduates to conduct scientific research in the chosen direction, to use scientific methods in conducting research, to analyze, generalize and use the results obtained.</p> <p>The content of the research practice is determined by the work program of the practice, taking into account the specifics of the direction of training, determined by the department to which the undergraduate is attached, as well as the place and conditions for conducting the research practice.</p>											
Cycle of major disciplines Selectable Component													
14	Diagnostics of elements of automation systems	The content of the discipline includes the characteristics of qualitative and quantitative indicators of the reliability of technical systems, their probabilistic and statistical evaluation based on test results, the study of the main methods for calculating the reliability of recoverable and non-recoverable systems, the analysis of the need and the choice of the redundancy rate, consideration of methods and models of technical diagnostics of automation systems. Training of specialists for independent solution of theoretical and applied problems related to the assessment, analysis, diagnostics and ensuring the reliability of systems.	5										v
15	Reliability of the control system and its elements	In the discipline "Reliability of the control system and its elements", the main terms, definitions and concepts in the theory of reliability, quantitative indicators of the reliability of renewable and non-renewable technical systems, the main methods for calculating the reliability of complex systems, types of tests for reliability, backup issues and determining the reliability of backup systems are considered. . To consolidate the theoretical materials, standard tasks are presented. As well as issues of reliability of automation and control systems.	5										v
16	Design of automation systems	The discipline studied the stages of designing process control systems. Methods for preparing project documentation in accordance with modern international standards; methods for automating the construction of mathematical models, analysis and synthesis systems using modern computer technologies and automation of scientific	5	v									v

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		research; trends in the development of science and technology and their impact on automation; The essence of the system approach in the design of modern hardware and software computing.											
17	Distributed control systems	The content of the discipline "Distributed control systems" includes the study of mathematical methods for describing, studying stability, assessing the quality of the control process of distributed systems. The issues of choosing the structure and composition of hardware and software for distributed control systems are considered. Methods and algorithms for building distributed control systems in various industries, methods of mathematical description, stability studies and quality assessment of the process of regulating distributed control systems.	5				✓						✓
18	Project management	After the successful completion of the discipline, undergraduates will gain knowledge about the key components of project management, with an emphasis on modern behavioral models of project-oriented business development management. The course program is built on international standards recognized by the business community PMI PMBOK, IPMA ICB and national standards of the Republic of Kazakhstan in the field of project management. The features of organizational management of business development through projects are studied in the interrelation of strategic, project and operational management. The system of practices, methods and procedures used in the innovative activity of organizations is considered, taking into account the psychological aspects of team building, communications and interaction with stakeholders.	5	✓									
19	New information technologies	The course "New Information Technologies" considers the fundamental problems and mathematical methods of systems theory, the characteristics of the stages of system analysis, the procedures for system analysis, the collection of data on the functioning of the system, the study of information flows, the construction of system models, the verification of the adequacy of models, the analysis of uncertainty and sensitivity, the study of resource opportunities, determination of the goals of system analysis, formation of criteria, generation of alternatives, implementation of choice and decision-making; Models of complex systems; Classification of types of modeling of complex systems, principles and approaches to the construction of mathematical models, stages of building a mathematical model, methods for qualitative assessment of systems, methods for quantitative assessment of systems, decision-making in conditions of conflict, risk, uncertainties,	5									✓	

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20	Modern actuators of automation systems	The course content discusses general issues of the theory of actuators of automation, outlines the principles of classification of actuators and their main characteristics, as well as issues related to actuators as an element of an automation system. The main purpose of training is to teach the ability to choose the right setting devices in automation systems, explaining that setting devices are the main elements in automation systems.	5								✓		
21	Microprocessor control systems for technological processes	In this discipline, emphasis is placed on the features of using the nomenclature of program-logical controllers produced by leading firms in the field of technical means of automation. It provides for the study of the use of the principles of organization and various classes of microprocessor systems, the acquisition of programming skills for embedded systems. A certain place is given to the design of hardware and software of microprocessor systems at the system, structural and logical stages of design.	5						✓	✓			
22	Robot Numerical Control Systems	The content of the discipline "Systems of Numerical Program Control of Robots" includes the study of mathematical methods of program control of robots, the basics of developing algorithms and cyclograms for controlling robots. The structure, composition and purpose of elements of cyclic, positional and contour systems of program control of robots, systems of numerical program control of machine tools, machines are considered.	5			✓		✓					
23	Optimal control systems (with AI elements)	The content of the discipline "Optimal control systems" includes the study of mathematical methods of optimal control based on the classical calculus of variations, the basics of the maximum principle and the method of dynamic programming. Models and methods of programmatic and stabilizing optimal control are considered. Methods for the synthesis of intelligent optimal control systems are considered separately. Training of highly qualified personnel who know the basics of research and construction of optimal control systems based on the methods of classical calculus of variations.	5							✓			
24	Vision systems (with AI elements)	The discipline "Vision Systems" deals with the main types of vision systems used in real-time control systems, features of vision hardware and software, ways of organizing and conducting experimental research in the field of vision systems. Methods of processing and transformation of inventions are studied.	5							✓			
25	Digital control systems	The content of the discipline "Digital Control Systems" includes the study of the mathematical apparatus for describing digital systems, describing digital systems in the time and frequency domains, and synthesizing digital controllers in the automation of production processes. Obtaining knowledge about the principles of construction	5		✓			✓					


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		and features of the use of digital control systems, the conditions for the feasibility and performance of digital control systems and their application in the automation of technological processes in industry.												
26	Robot Control Dynamics	The content of the discipline "Robot control dynamics" includes the study of mathematical approaches to cyclic, positional and contour control of industrial robots, models and algorithms for kinematic and dynamic analysis of industrial robots, studies of the kinematics and dynamics of the manipulator and drive system of an industrial robot.	5						✓					
27	Automation of control system design	The content of the discipline "Automation of the design of control systems" includes the study of methods of analysis and synthesis of control systems, the choice of structure and the calculation of the parameters of the control law. The procedures for the analytical design of regulators, the development of structural, functional and other automation schemes using modern application software packages (APP) are considered. Mastering methods and algorithms for constructing mathematical models of objects and calculating modern automatic control systems.	5	✓										
28	Automated design of robotic systems	The course "Automated design of robotic systems" considers the training of specialists who own the theoretical foundations of designing control systems and methods for performing experimental and computational work on the creation and operation of automation systems based on modern software and hardware.	5	✓										
29	Robotic technological complexes in discrete industries	The content of the discipline "Robotic technological complexes in discrete industries" includes the study of mathematical methods of program control of robots, the basics of developing algorithms and robot control cyclograms. The structure, composition of cyclic, positional and contour systems of program control of robots, systems of digital program control of machine tools and machines are considered. Methods for developing algorithms and cyclograms for controlling robots as part of a robotic system, developing cyclic, positional and contour systems for program control of robots.	5										✓	
30	Modern local automation and control systems	The content of the discipline includes the study of modern approaches to the analysis and synthesis of automatic control systems based on the methodology of the "state space". The properties of linear and nonlinear systems and methods of their study are considered from the unified positions of the state space method. Basic information about systems with variable structure, modal control, identification, adaptation and optimization in control systems is given.	5					✓						

5. Curriculum of the educational program

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APPROVED
Chairman of the Management Board
Respublikan, named after K. Satpayev
M.M. Irgaliyev
2022 y.

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

Educational program 7M07101 - "Automation and robotization"
Group of educational programs M100 - "Automation and control"

Discipline code	Name of disciplines	Cycle	Total amount in credits	Total hours	Classroom amount (lec/lab/pr)	SIS (including TESIS) in hours	Form of control	Academic degree: Master of Technical Sciences			
								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)											
LNG230	English (professional)	BD UC	5	150	0/0/0	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		
M-2. Module of theoretical foundations of management (optional component)											
1201	Elective	BD CCH	5	150	2/0/1	105	E	5			
1202	Elective	BD CCH	5	150	2/0/1	105	E	5			
AUT708	Automation of technical systems	PD UC	5	150	2/0/1	105	E	5			
1202	Elective	PD CCH	5	150	2/0/1	105	E		3		
2307	Elective	PD CCH	5	150	2/0/1	105	E			3	
M-3. Control system design module (optional component)											
1203	Elective	BD CCH	5	150	2/0/1	105	E			3	
1301	Elective	PD CCH	5	150	2/0/1	105	E	5			
1303	Elective	PD CCH	5	150	2/0/1	105	E		5		
2304	Elective	PD CCH	5	150	2/0/1	105	E			3	
2305	Elective	PD CCH	5	150	2/0/1	105	E			3	
2306	Elective	PD CCH	5	150	2/0/1	105	E			3	
2308	Elective	PD CCH	5	150	2/0/1	105	E			3	
M-4. Practice-oriented module											
AAP220	Pedagogical practice	BD UC	6							6	
AAP256	Research practice	PD UC	4								4
M-5. 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	
AAP244	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-6. Module of final attestation											
ECA205	Preparation and defense of a master's thesis	FA	12								12
Total based on UNIVERSITY:								30	30	10	30
								40	60		

Number of credits for the entire period of study					
Cycle code	Cycles of disciplines	Credits			Total
		university component (UC)	component of choice (CCH)		
BD	Cycle of basic disciplines	20	15		35
PD	Cycle of profile disciplines	24	25		49
	<i>Total for theoretical training:</i>	44	40		84
	RWMS				24
FA	Final attestation	12			12
	TOTAL:	12	44	40	120

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Decision of the Academic Council of Kazntu named after K.Satpayev, Protocol No. 13 or "27" of 04 2022г.

Decision of the Educational and Methodological Council of Kazntu named after K.Satpayev, Protocol No. 7 or "14" of 04 2022г.

Decision of the Academic Council of the Institute AaIT, Protocol No. 6 or "27" of 01 2022г.

Vice-Rector for Academic Affairs

Institute Director of AaIT

Department Head of AaC

Representative of the Council from
employers



B.A. Zhanikov


B.K. Uvkebayeva

N.U. Aldiyarov

S.K. Abdigaliyev

5.1. Elective disciplines of the educational program

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



APPROVED
Director of the Institute of Automation and
Information Technology
R.K. Uskenbayeva
2022 y.

ELECTIVE DISCIPLINES of the educational program for recruitment for the 2022-2023 academic year
Educational program 7M07101 - "Automation and robotization"
Group of educational programs M100 - "Automation and control"

Form of study: full-time Duration of study: 2 year Academic degree: Master of Technical Sciences

Elective code according to the curriculum	Discipline code	Name of disciplines	Semester	Cycle	Credits	Iek/lab/privs
Module of theoretical foundations of management						
1201	AUT703	Modern control theory	1	B	5	2/0/1/3
	AUT297	Integrated automation technology and management				2/0/1/3
1202	AUT266	Data Mining Methods	1	B	5	2/0/1/3
	AUT267	Intelligent technology in robotics				2/0/1/3
1302	AUT299	Diagnostics of system automation	2	P	5	2/0/1/3
	AUT700	The reliability of the management system and its elements				2/0/1/3
2307	AUT225	Automation systems design	3	P	5	2/0/1/3
	AUT707	Distributed Control Systems				2/0/1/3
	MNG705	Project Management				2/0/1
Control system design module						
1203	AUT217	Optimal control automation objects	2	B	5	2/0/1/3
	AUT264	MES systems				2/0/1
1301	AUT709	New information technologies	1	P	5	2/0/1/3
	AUT285	Modern executive devices of automation systems				1/1/1/3
1303	AUT271	Microprocessor control systems of technological processes	2	P	5	1/1/1/3
	AUT272	Systems for numerical programmable control of robots				1/1/1/3
2304	AUT705	Optimal control systems	3	P	5	2/0/1/3
	AUT706	Technical Vision system				2/0/1/3
2305	AUT237	Digital control systems	3	P	5	1/1/1/3
	AUT251	Dynamics of robot control				2/0/1/3
2306	AUT701	Automation of control systems design	3	P	5	2/0/1/3
	AUT702	Automated projection of robotic systems				2/0/1/3
2308	AUT228	Robotic technological complexes in discrete productions	3	P	5	2/0/1/3
	AUT231	Modern local automation and control systems				1/1/1/3
The "R&D" module						
2307	MNG705	Project Management	3	P	5	2/0/1

The number of credits in elective subjects for the entire period of study	
Cycles of disciplines	Credits
Cycle of basic disciplines (B)	15
Cycle of profile disciplines (P)	40
TOTAL:	55

Decision of the Academic Council of the Institute: A&IT, Protocol No 6 of 22 of 04 2022 y.

Head of the Department "Automation and Control" N.U. Aldiyarov

Representative of the Council from employers S.K. Abdigaliyev

6. Additional educational programs (Minor)

Name of additional educational programs (Minor) with disciplines	Total number of credits	Recommended semesters of study	Documents on the results of development additional educational programs (Minor)