

"Kazakh University of Technology and Business" named after K.Kulazhanova" JSC

EDUCATIONAL PROGRAM

7M07188- «Automation and Control»
code and name of the educational program

Level: Master's (scientific and pedagogical)

Approved

by the Board of Directors of JSC

«K. KulazhanovKazUTB» «18» 03 2026,
protocol No. 4



Recommended

by the Academic Council of JSC

«K. KulazhanovKazUTB» «27» 02 2026,
protocol No. 7

Astana – 2026

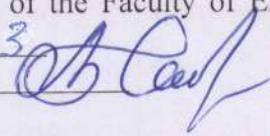
CONTENT

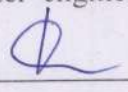
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Preface

The educational program 7M07188-“Automation and Control” was developed in accordance with the State Compulsory Standard of Higher Education / Postgraduate Education, approved by Order No. 2 of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022, as well as on the basis of professional standards: “Teacher (Teaching Staff) of Organizations of Higher and/or Postgraduate Education” No. 591 dated 20.11.2023; “Cloud IoT Systems Engineer” No. 222 dated 05.12.2025; the Atlas of New Professions “Edge Computing Architect” and “Artificial Neural Network Development Engineer”; Regional Standard of the Aktobe Region “Enrichment Technologist with IT Skills”.

The educational program «7M07188- Automation and Control» was approved at the meeting of the Council on Academic Quality on "22" 01 2026, protocol No. 3
Chairman Askarbekov E.B. 

The educational program «7M07188- Automation and Control» was approved at the meeting of the Commission on Academic Quality of the Faculty of Engineering and Information Technologies on "25" 12 2025 protocol No. 3
Chairman Serimbetov B.A. 

The educational program «7M07188- Automation and Control» was developed and discussed at the meeting of the department of Computer engineering and automation dated "17" 11 2025 protocol No. 4
Head of department Akishev K.M. 

Approval sheet

Educational program «7M07188- Automation and Control»

AGREED:

Vice-Rector for Administrative Affairs		E. Askarbekov	"22" 01 2026 year
Head of Educational Programs Department		B. Bayadilova	"22" 01 2026 year
Chief Engineer of ADAL SISTEM LLP		Y. Lavrentyev	"17" 11 2025 year
Director of ZHOBA LTD LLP		R.K. Bersinkulov	"17" 11 2025 year
Director of INNOTECH GROUP LLP		E.M. Galimzhan	"17" 11 2025 year
Production Director of DMK Construction LLP		Zh.A. Zharasov	"17" 11 2025 year
Director of ENERGY SYSTEMS PROJECT LLP		A.K. Bimendin	"17" 11 2025 year
Master's student		N. Sadu	"17" 11 2025 year

1 Passport of the educational program

International Standard Classification of Education (ISCED) level	7
National Qualification Framework (NQF) level	7
Sectoral Qualifications Framework (SQF) level	7
Code and name of the field of education	7M07- Engineering, manufacturing and construction fields
Direction of training	7M071- Engineering and Engineering
Number and name of the group of educational programs	M100- Automation and control
Code and name of the educational program (EP)	7M07188- Automation and control
Educational program profile	Scientific and pedagogical
Goal of the educational program	The purpose of this master's program is to prepare masters who are required in various sectors of the economy and industry of the Republic of Kazakhstan, who are able to effectively solve pressing problems in the field of automation and control, who have received theoretical and practical skills in solving engineering problems and designing various automation facilities, who are able to conduct research, develop and implement automated control systems for technological processes and objects.
Completion criterion of an educational program	At least 120 academic credits, including all types of undergraduate academic activities
Language of instruction of the	Kazakh, Russian
Distinctive features of the educational program	Accreditation of the OP by the International Accreditation Agency for Quality Assurance of Education IAAR
Partner University	-

2 Qualification characteristics of a graduate of an educational program

Degree awarded	Master of Technical Sciences in the educational program «7M07188 - Automation and Control»
Field of professional activity	The modular educational program was developed by the faculty of the Department of Information Technology at the Kazakh University of Technology for the preparation of Masters of Technical Sciences in the educational program «7M07188- Automation and Control». The OP sets the requirements for the content of the studied modules and the level of master's degree in the educational program «7M07188- Automation and Control». The OP is provided during accreditation and licensing, as well as to potential employers for familiarization and making recommendations. Organizational and managerial: - managing the activities of departments and organizations involved in projects in the field of implementation of electronic automation and control tools; - work in research institutes, scientific and industrial associations of any form of ownership, state and non-state educational institutions of any level.; Scientific and research: - scientific research in the field of electronics, automation and control; Project information: - design, development and maintenance of electronic automation systems for various branches of human activity; Pedagogical: implementation of educational services in the field of industrial electronics, automation and control
Types of professional activity	Design and engineering; Production and technological; Organizational and managerial; Scientific research; Pedagogical.
Objects of professional activity	Manufacturing enterprises, Government agencies, defense enterprises, organizations that use digital tools and implement electronic automated control systems in production processes, enterprise management, personnel management, public administration, and state border protection.
Functions of professional activity (labor functions)	Ensuring uninterrupted operation of electronic devices for various functional purposes and design. Creation and improvement of methods and means of information transformation using electronic means and technologies.

3 Requirements for the content of the educational program

Name of cycles and disciplines	Workload in academic credits
Theoretical training	88
Cycle of basic disciplines (BD)	35
University component	20
Including:	
History and Philosophy of Science	4
Foreign Language (Professional)	4
Higher Education Pedagogy	4
Management Psychology	4
Teaching Practice	4
Elective Component (EC)	15
Cycle of Major Disciplines (MD)	53
University Component (UC):	10
Elective Component (EC)	30
Research Practice	13
Master's Research Work	24
Experimental and research work of a master's student, including an internship and a master's project	24
Final certification (FC)	8
Total	120
Theoretical Training	88

4 Competency map of the educational program «7M07188- Automation and control»

Competence map of the educational program	Learning outcome code	Learning Outcome (according to Bloom's Taxonomy)
Behavioral skills and personality traits (Softskills)	LO1	Conducts research in the field of information technology based on a holistic systematic scientific worldview using knowledge of the history and philosophy of science.
	LO2	Uses modern methods and technologies of scientific and professional communication in a foreign language in the field of professional activity.
	LO3	Applies psychologically grounded approaches to managing the educational process and interacting with future specialists, demonstrating the ability for active social mobility and independent mastering of new research methods.
	LO4	Possesses the skills of pedagogical, scientific-methodological, and research activities in the field of automation and control, using professional and practical skills for conducting scientific research and making managerial decisions
Digitalcompetencies (Digitalskills)	LO5	Develops systems based on artificial neural networks and mathematical modeling, ensuring their network functioning, monitoring of condition and operability, optimization of design solutions, and service maintenance.
	LO6	Possesses the methodology of scientific cognition for solving research problems, the basic principles of the formation and organization of scientific management of ACS, the selection, processing, and planning of experiments, as well as the analysis and evaluation of the effectiveness of using the principles of scientific management.
	LO7	Analyzes scientific and technical information on the research topic using modern IT technologies.
Professionalskills(Hardskills)	LO8	Designs solutions in the field of kinematics, mathematical modeling, and control of robotic and mechatronic systems, as well as automated production and control software, ensuring their effective operation, including project management and solving non-standard inventive problems
	LO9	Performs engineering calculations and process modeling using software tools of SCADA, CAD, CAE systems and SADT methodologies.
	LO10	Designs edge computing and automated control systems based on methods of mathematical modeling, mechatronics, and stability theory, ensuring network-level operation, interaction between data centers and peripheral devices, as well as optimization of computational load distribution and production processes.

5 Learning outcomes of the educational program and modules

Key competencies	Learning Outcomes (LO) for the educational program	Name of module	Learning outcomes for the module	The name of the disciplines that form the learning outcomes
Behavioral skills and personality traits (Soft skills)	LO1 Conducts research in the field of information technology based on a holistic systematic scientific worldview using knowledge of the history and philosophy of science.	Module 1. Basic Module.	Demonstrates skills in applying methods and methodologies for selecting, processing, planning experiments, and analyzing the results obtained from scientific research.	History and philosophy of science
	LO2 Uses modern methods and technologies of scientific and professional communication in a foreign language in the field of professional activity.		Uses logical analysis techniques when working with scientific texts in a foreign language. Demonstrates knowledge of modern methods and technologies of professional communication in a foreign language.	
	LO3 Applies psychologically grounded approaches to managing the educational process and interacting with future specialists, demonstrating the ability for active social mobility and independent mastering of new research methods.		Demonstrates the ability to apply psychological knowledge for self-awareness and understanding of others.	Management psychology
	LO4 Possesses the skills of pedagogical, scientific-methodological, and research activities in the field of automation and control, using professional and practical skills for conducting scientific research and making managerial decisions		Uses teaching methodology knowledge in organizing and conducting educational classes. Demonstrates knowledge of the theoretical and methodological foundations of teaching, the development of professional and pedagogical culture, and ethical values. Develops curricula and lesson plans using various teaching methods and technologies.	

Digital competencies (Digital skills)	LO5 Develops systems based on artificial neural networks and mathematical modeling, ensuring their network functioning, monitoring of condition and operability, optimization of design solutions, and service maintenance.	Module 3. Systems Engineering and Artificial Intelligence Methods.	Uses the methodology of mathematical and simulation modeling, demonstrates skills in developing mathematical and simulation models of research, mathematical formulation of the research problem	Artificial Intelligence Methods and Technologies
		Module 2. Scientific Research in Automation and Control.	Demonstrates the skills of using decision-making techniques for various conditions, applies basic principles, classification of methods to solve optimization problems.	Organization and Management of Automated Production Systems)
	LO6 Possesses the methodology of scientific cognition for solving research problems, the basic principles of the formation and organization of scientific management of ACS, the selection, processing, and planning of experiments, as well as the analysis and evaluation of the effectiveness of using the principles of scientific management.	Module 2. Scientific Research in Automation and Control.	Demonstrates the skills of using methods and methodologies in selecting, processing, planning experiments, and processing the results of scientific research.	Theory of Oscillations Software Tools for Automation and Control Systems.
	LO7 Analyzes scientific and technical information on the research topic using modern IT technologies.	Module 2. Scientific Research in Automation Control.	Demonstrates skills in applying decision-making methodologies under various conditions and uses the fundamental principles and classification of methods for solving optimization problems.	Methods of Mathematical and Simulation Modeling.

Professional skills (Hardskills)	LO8 Designs solutions in the field of kinematics, mathematical modeling, and control of robotic and mechatronic systems, as well as automated production and control software, ensuring their effective operation, including project management and solving non-standard inventive problems	Module 4. Automation and Robotics Systems.	Possesses knowledge of systems engineering methods and automation and robotics technologies, including the design, modeling, and optimization of automated and robotic systems. Is able to apply modern control tools, automatic control algorithms, and data processing methods to solve applied problems in the automation of industrial and technological processes..	Kinematic Schemes of Robots and Manipulators.
		Module 2. Scientific Research in Automation Control.	Demonstrates skills in applying decision-making methodologies under various conditions and uses the fundamental principles and classification of methods for solving optimization problems.	Mathematical Formulation of Research Problems Optimization of Design Solutions Design of Mechatronic Systems Stability and Reliability of Machines and Mechanisms.
	LO9 Performs engineering calculations and process modeling using software tools of SCADA, CAD, CAE systems and SADT methodologies.	Module 2. Scientific Research in Automation Control.	Demonstrates skills in applying decision-making methodologies under various conditions and uses the fundamental principles and classification of methods for solving optimization problems.	Integrated Control Systems in Automated Production Methodology of Scientific

			Research Aspects and Principles of Scientific Research Application of Data Communication Networks in Automated Control Automation of Electric Drive Control Systems Application of Data Communication Networks in Automated Control Modern Software Tools for the Design of Automated Control Systems Modern Communication Technologies
		LO10 Designs edge computing and automated control systems based on methods of mathematical modeling, mechatronics, and stability theory, ensuring network-level operation, interaction between data centers and peripheral devices, as well as optimization of computational load distribution and production processes.	Module 2. Scientific Research in Automation Control. Demonstrates skills in applying decision-making methodologies under various conditions and uses the fundamental principles and classification of methods for solving optimization problems.

			Control of Flexible Automated Manufacturing Systems
	Module 3. Systems Engineering and Artificial Intelligence Methods.	Uses the methodology of mathematical and simulation modeling, demonstrates skills in developing mathematical and simulation models of research, mathematical formulation of the research problem	SADT Methodology
	Module 4. Automation and Robotics Systems.	Possesses knowledge of systems engineering methods and automation and robotics technologies, including the design, modeling, and optimization of automated and robotic systems. Is able to apply modern control tools, automatic control algorithms, and data processing methods to solve applied problems in the automation of industrial and technological processes..	Control of Robotic Systems

6 The relationship between the attainability of the formed learning outcomes according to the educational program and academic disciplines

№	Name of the discipline	Brief description of the discipline	Number of credits	Generated learning outcomes (codes)									
				LO1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10
Cycle of basic disciplines													
University component/Elective component													
1	Foreign Language (Professional)	The discipline is aimed at developing academic interaction and scientific writing skills. While studying the subject, the master's student systematizes foreign information in their field of expertise and conducts professional activities in a foreign language. This enables the effective presentation of original research results in an international environment, the preparation of articles for high-ranking journals, and the delivery of lectures on specialized subjects, thereby enhancing the overall competitiveness of the future researcher.	4			+							
2	History and Philosophy of Science	The discipline aims to cultivate a culture of scientific thinking and develop methodological analysis skills. The learning process focuses on a profound understanding of the	4			+							

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7 Alignment of planned learning outcomes with assessment technologies and teaching methods within the module

Learning Outcomes (LO) Number	Planned learning outcomes for the module	Assessment technologies (tools)	Methods of learning and teaching
LO1	Conducts research in the field of information technology based on a holistic systematic scientific worldview using knowledge of the history and philosophy of science.	Business games, case study, presentation, report, oral interview	Information theory (demonstration of educational material, explanation, story)
LO 2	Uses modern methods and technologies of scientific and professional language communication in a foreign language in the field of professional activity.	Business games, case study, presentation, report, oral interview	Information theory (demonstration of educational material, explanation, story)
LO 3	Applies psychologically grounded approaches to managing the educational process and interacting with future specialists, demonstrating the ability for active social mobility and independent mastering of new research methods.	Creative assignments, presentation, oral interview, report, messages	Information theory (demonstration of educational material, explanation, story)
LO 4	Possesses the skills of pedagogical, scientific-methodological, and research activities in the field of automation and control, using professional and practical skills for conducting scientific research and making managerial decisions	Business games, case study, presentation, report, oral interview, Scientific publications	Information theory (demonstration of educational material, explanation, story)
LO 5	Develops systems based on artificial neural networks and mathematical modeling, ensuring their network functioning, monitoring of condition and operability, optimization of design	Project activities, creative assignments, oral interview, Scientific publications	Search and creative teaching methods (observation, experience, experiment)

	solutions, and service maintenance.			
LO 6	Possesses the methodology of scientific cognition for solving research problems, the basic principles of the formation and organization of scientific management of ACS, the selection, processing, and planning of experiments, as well as the analysis and evaluation of the effectiveness of using the principles of scientific management.	Project activities, creative assignments, oral interview, Scientific experience, publications	Search and creative teaching methods (observation, experience, experiment)	
LO 7	Analyzes scientific and technical information on the research topic using modern IT technologies.	Project activities, creative assignments, oral interview, Scientific publications	Search and creative teaching methods (observation, experience, experiment)	
LO 8	Designs solutions in the field of kinematics, mathematical modeling, and control of robotic and mechatronic systems, as well as automated production and control software, ensuring their effective operation, including project management and solving non-standard inventive problems	Research work of a master's student, completion of a master's thesis, preparation and defense of a master's thesis, report, communication, presentation	The method of independent work (reading, examination)	
LO 9	Performs engineering calculations and process modeling using software tools of SCADA, CAD, CAE systems and SADT methodologies.	Scientific publications, creative assignments, presentation, case study, interview, report, oral interview	Search and creative teaching methods (observation, experience, experiment)	
LO 10	Designs edge computing and automated control systems based on methods of mathematical modeling, mechatronics, and stability theory, ensuring network-level operation, interaction between data centers and	Scientific publications, creative assignments, presentation, case study, interview, report, oral interview	Search and creative teaching methods (observation, experience, experiment)	

	peripheral devices, as well as optimization of computational load distribution and production processes.		
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8 Correlation of learning outcomes of the educational program with the labor functions of professional standards (if any)

Name of the professional standards used	Professions at level 7 of the SQF	Labor functions	Tasks	Learning outcomes for the educational program
Academic (Teaching Staff) of Higher Postgraduate Institutions	Lecturer, Senior Lecturer / Senior Lecturer in the field of education, HEI (Higher Education Institution) and/or Postgraduate Education Institution)	Labor Function 1: Teaching	Task 1: Develop teaching and learning materials for the disciplines taught, and research activities in the field of automation and control, using the professional and practical skills for conducting scientific research taking into account the integration of education, research, and innovation	Possesses the skills of pedagogical, scientific-methodological, and research activities in the field of automation and control, using the professional and practical skills for conducting scientific research of and making managerial decisions
		Labor Function 2: Conducting experimental Research	Task 1: Participate in research, development, and design activities, as well as in the implementation of creative projects.	LO 6. Possesses the methodology of scientific cognition for solving research problems, the basic principles of the formation and organization of scientific management of ACS, the selection, processing, and planning of experiments, as well as the analysis and evaluation of the effectiveness of using the principles of scientific management.
IoT Systems Development	Cloud Systems Engineer	IoT Labor Function 1: IoT Device Management	Task 1: Perform classification, selection, and processing of big data solutions, and address to identify and address	LO 5. Develops systems based on artificial neural networks and mathematical modeling, ensuring their network functioning, and monitoring of condition and operability, optimization of design solutions, and service maintenance.

			industry-specific requirements and challenges.	LO 7. Analyzes scientific and technical information on the research topic using modern IT technologies.
			Task Identify and define the modeling, and control of robotic and mechatronic systems, as well as hardware and software automated production and control software, ensuring their effective operation, including project management and solving non-standard inventive problems	2: LO 8. Designs solutions in the field of kinematics, mathematical modeling, and control of robotic and mechatronic systems, as well as hardware and software automated production and control software, ensuring their effective operation, including project management and solving non-standard inventive problems
			Labor Function 1: Design and Development of Edge Computing Systems 2: Analysis and Monitoring of IoT Devices	LO 10. Designs edge computing and automated control systems based on methods of mathematical modeling, mechatronics, and stability theory, ensuring network-level operation, interaction between data centers and peripheral devices, as well as optimization of computational load distribution and production processes.
Atlas of Emerging Professions	Edge Computing Architect https://atlasbt.enbek.kz/ru/profession/58		Labor Function 1: Design and Development of Edge Computing Systems 2: Coordination of Data Centers and Optimization of Computational Workloads Between the Cloud and the	LO 10. Designs edge computing and automated control systems based on methods of mathematical modeling, mechatronics, and stability theory, ensuring network-level operation, interaction between data centers and peripheral devices, as well as optimization of computational load distribution and production processes.

		Edge			
Atlas of Emerging Professions	Artificial Neural Network Development Engineer https://atlasbt.enbek.kz/ru/profession/65	Labor Function 1: Development and Deployment of Artificial Neural Networks			LO 5 . Develops systems based on artificial neural networks and mathematical modeling, ensuring their network functioning, monitoring of condition and operability, optimization of design solutions, and service maintenance.
		Labor Function 2: Monitoring the Status and Performance of Neural Networks			
Regional Standard of the Aktobe Region	Mineral Processing Technologist with IT Skills https://clek.ru/3TeKoy	Labor Function 1: Implementation of Software for Industrial Production,			LO 8. Designs solutions in the field of kinematics, mathematical modeling, and control of robotic and mechatronic systems, as well as automated production and control software, ensuring their effective operation, including project management and solving non-standard inventive problems

9 Graduate model

GRADUATE MODEL			
Professional standard Development of IoT systems	Competencies(soft skills, digital skills)		
	Attributes of a graduate	knowledge	Skills
	-High professionalism in the field of Automation and management; - Emotional intelligence; -Adaptability to global challenges; - Leadership; -Skill in creating documentation for IoT and AI systems, including user instructions and technical descriptions	- Characteristics of devices and their application in industries. - Software tools for IoT systems - Methodology of machine-to-machine interaction - Technology of working with embedded systems - Incident detection and response methods - Theory of electromagnetic compatibility, fundamentals of radio wave propagation, coverage area calculations, routing algorithms in wireless networks.	- Establish communication between sensors and readers with mobile devices, Wi-Fi, and a server. - Perform error correction tasks at the network level - Understand network devices and their interaction with sensors and readers. - Take into account the computing power of devices and regulate the flow of information.
	Professional skills(hardskills)		
	-Defines the essence and content of the processes of management, management, entrepreneurship and management; - Has the ability to establish communication and decision-making processes; has the ability to choose an effective leadership style and leadership, methods of managing groups, conflicts, and stress; -Possesses communication skills to communicate with colleagues and customers in the process of project development, as well as participates in the organization and management of projects		

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**International Academic Advisor Confirmation/Шетелдік кеңесшінің қатысуы/
Участие зарубежного консультанта**

Educational Program/ Білім беру бағдарламасы/ Образовательная программа	<u>7M07188 - Automation and Control</u> <u>7M07188 - Автоматтандыру және басқару</u> <u>7M07188 - Автоматизация и управление</u>
Level/ Дәрежесі/ Уровень	<u>Master's Degree/Магистр/Магистр</u>
International Academic Advisor/ Шетелдік академиялық кеңесші/ Зарубежный консультант	<u>Курманбек уулу Талантбека</u> <u>Курманбек уулу Талантбека</u> <u>Kurmanbek uulu Talantbek</u>
Academic degree/ Ғылыми дәреже/ Ученая степень	<u>Doctor of Technical Sciences</u> <u>Техника ғылымдарының докторы</u> <u>Доктор технических наук</u>
Position/ Лауазымы/ Должность	<u>Dean of the Faculty of Physics, Mathematics and Information Technologies; Vice-Rector for Academic Affairs</u> <u>Физика-математика және ақпараттық технологиялар</u> <u>факультетінің деканы; Оқу жұмысы жөніндегі проректор</u> <u>Декан факультета физико-математического образования и</u> <u>информационных технологий; проректор по учебной</u> <u>работе</u>
University/ Университет/ Университет	<u>Kyrgyz State University named after I. Arabaev</u> <u>И. Арабаев атындағы Кыргыз мемлекеттік университеті</u> <u>Кыргызский государственный университет им. И. Арабаева</u>
Country/ Ел/ Страна	<u>Kyrgyzstan / Кыргызстан / Кыргызстан</u>

Approved/ Келісілді/ Согласовано

The educational program has been reviewed and approved. The updated content of the educational program, the sequence of courses, and the revised learning outcomes (LO) have been developed in accordance with modern academic approaches.

Білім беру бағдарламасы қарастырылып, келісілді. Білім беру бағдарламасының жаңартылған мазмұны, пәндерді оқу реттілігі және жаңартылған оқу нәтижелері (ОН) заманауи академиялық тәсілдерге сәйкес әзірленді.

Образовательная программа рассмотрена и согласована. Актуализированное содержание образовательной программы, последовательность изучения дисциплин и обновленные результаты обучения (РО) сформированы с учетом современных академических подходов.

International Academic Advisor/ Шетелдік академиялық кеңесші/ Зарубежный консультант	<u>Курманбек уулу Т.</u> <u>Курманбек уулу Т.</u>
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Курманбек уулу Т. _____ 25.04.2026



12 Expert Opinion

on the Educational Program 7M07188 «Automation and Control» under the field of study
7M071 Engineering and Engineering Trades (Master's Degree)

ENERGY SYSTEMS PROJECT LLP

Astana, Republic of Kazakhstan

General Characteristics of the Educational Program

The educational program 7M07188 «Automation and Control» is aimed at training master's degree specialists possessing modern research and engineering competencies in the field of automated control systems, intelligent data processing technologies, and digital modeling of industrial processes.

The relevance of the program is determined by several key factors.

Under the conditions of rapid technological development, the role of scientific research in automation and control is steadily increasing. The development and implementation of intelligent control algorithms, mathematical modeling methods, and artificial intelligence technologies require specialists capable of conducting research and creating innovative solutions for various industries.

Particular importance is attached to the application of scientifically grounded approaches to the modernization of industrial enterprises. Modern industries require specialists capable of developing effective automation strategies that ensure higher productivity, reliability, and energy efficiency of technological processes.

An additional factor contributing to the relevance of the program is governmental support for scientific research and innovation activities. The implementation of national digital development and scientific-technological modernization programs creates favorable conditions for conducting research in the field of automation and intelligent control systems.

During their studies, master's students participate in research projects, grant-funded programs, and international scientific events, which contributes to the development of research competencies and expands opportunities for integrating Kazakhstan's scientific achievements into the global scientific community.

Description and Evaluation of the Educational Program Structure

The structure of the educational program has been developed in accordance with current requirements for master's degree education and includes the following components:

- General education disciplines – 30 credits;
- Major disciplines – 48 credits;
- Research work of the master's student – 24 credits;
- Professional practice – 10 credits;
- Final certification – 8 credits.

The total workload of the educational program is 120 academic credits.

One of the major advantages of the program is its close cooperation with industrial enterprises and organizations that provide a platform for conducting research and testing developed solutions. Such cooperation enables master's students to apply acquired knowledge to real industrial challenges, improve practical skills, and gain research experience in a modern production environment.

The integration of the educational process with the industrial sector contributes to improving the quality of graduate training, enhancing professional competitiveness, and increasing demand for graduates both in science and across various sectors of the economy.

General Conclusion

The educational program 7M07188 «Automation and Control» provides training for highly qualified research-oriented specialists capable of conducting scientific research and developing and implementing modern automation and industrial process control technologies.

The combination of fundamental academic training, practical orientation, research project implementation, and international cooperation makes this educational program highly relevant and promising for training specialists in the field of industrial automation and digitalization.

Based on the conducted analysis, the educational program is recommended for implementation in the educational process of K. Kulazhanov Kazakh University of Technology and Business.

Director
ENERGY SYSTEMS PROJECT LLP
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Republic of Kazakhstan,
010010, Astana, Almaty District,
3 Tauelsizdik Avenue.



12 Expert Opinion

on the Educational Program 7M07188 «Automation and Control» under the field of study
7M071 Engineering and Engineering Trades
INNOTECH GROUP LLP
Astana, Republic of Kazakhstan

General Characteristics of the Educational Program

The educational program (EP) 7M07188 «Automation and Control» submitted for review has been developed by the Department of Automation and Control of K. Kulazhanov Kazakh University of Technology and Business in accordance with the national and sectoral qualification frameworks, as well as professional standards.

The relevance of training master's degree specialists in the field of Automation and Control is determined by the following factors:

- The development of Industry 4.0 and digital technologies requires advanced training of specialists possessing competencies in artificial intelligence, Industrial Internet of Things (IIoT), Big Data, and robotic systems.
- Kazakhstan is experiencing a growing demand for research and innovation in automated control systems, making master's education a key element in training scientific personnel and developing new technologies.
- According to strategic documents such as the Digital Kazakhstan Program and the National Industrial Development Program, one of the priority tasks is the development of automated process control systems, which requires scientific and research support.
- The program is focused on conducting research aimed at optimizing technological processes, reducing costs, and improving energy efficiency in enterprises.
- During their studies, master's students master simulation modeling methods and the design of intelligent control systems, contributing to the creation of competitive solutions for domestic industry.
- Enterprises in Kazakhstan require scientifically grounded solutions and specialists capable of developing new approaches to managing industrial processes.

Description and Evaluation of the Educational Program Structure

The structure of the educational program includes the following components:

- General education disciplines – 30 credits;
- Major disciplines – 48 credits;
- Research work – 24 credits;
- Professional practice – 10 credits;
- Final certification – 8 credits.

The total number of credits is 120.

The program is aimed at developing students' research competencies, enabling them to participate in applied research projects and develop innovative solutions in the field of automation and control. Particular attention is paid to integrating theoretical knowledge with practical industrial tasks, allowing master's students to develop and implement solutions aimed at the digitalization and automation of industrial facilities.

Research internships are conducted at leading universities and enterprises of the country, where students have the opportunity to work with advanced technologies, analyze production processes, and propose optimal automation methods. This cooperation strengthens ties between science and industry and enhances graduate employability.

General Conclusion

The educational program 7M07188 «Automation and Control» meets the current requirements of the labor market of Kazakhstan, promotes the development of research

activities, and enables the training of highly qualified specialists capable of solving modern automation and control challenges in industry.

Therefore, the program is recommended for implementation in the educational process of K. Kulazhanov Kazakh University of Technology and Business.

Director of INNOTECH GROUP LLP
Y. M. Galimzhan
Republic of Kazakhstan
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Astana, 010000



12 Expert Opinion

on the Educational Program 7M07188 “Automation and Control” within the field of training 7M071 Engineering and Engineering Trades
DMK Construction LLP, Republic of Kazakhstan, Astana
Republic of Kazakhstan, Astana City

General Characteristics of the Educational Program

The educational program (EP) 7M07188 “Automation and Control” is aimed at training highly qualified scientific and engineering personnel capable of conducting fundamental and applied research in the field of automated control systems, intelligent technologies, and digital modeling of complex industrial processes.

The relevance of the program is determined by the following factors:

Development of research in automation. The implementation of new methods of digital control, mathematical modeling, and machine learning algorithms requires profound scientific research, making the master's program an important component in the development of innovative solutions.

Global trends in automation and digitalization. The implementation of the Industry 4.0 concept creates new challenges for science related to the development of intelligent manufacturing systems, digital twins, and predictive control technologies.

The need for a research-based approach in industry. Domestic enterprises require scientifically grounded automation strategies that ensure improved efficiency, energy performance, and reliability of technological processes.

Government support for scientific activities. The “Digital Kazakhstan” program and the national science development priorities for 2023–2029 provide active funding for research in intelligent control systems and automation, expanding opportunities for scientific advancement in this field.

Master’s students are provided with opportunities to participate in grant-funded research projects and scientific conferences, facilitating the integration of Kazakhstan’s scientific achievements into the global research community.

Description and Evaluation of the Educational Program Structure

The master's degree program includes the following components:

The EP structure consists of:

- General education disciplines (30 credits);
- Major/professional disciplines (48 credits);
- Research work (24 credits);
- Professional internship (10 credits);
- Final certification (8 credits).

The total number of credits is **120**.

Partner enterprises such as Astana Ceramics LLP and AG TECH provide research and development facilities for testing new methods and technologies developed by master’s students. This enables the integration of academic training with real industrial challenges, significantly increasing graduates’ employability and demand in both science and industry.

General Conclusion

The educational program 7M07108 “Automation and Control” is designed to train researchers and scientific professionals capable of developing and implementing innovative technologies in industry. The program combines fundamental knowledge, practical implementation of research projects, and international cooperation, making it essential for the development of advanced automation fields in Kazakhstan. Therefore, the educational program

is recommended for implementation in the educational process of K. Kulazhanov Kazakh University of Technology and Business.

Production Director
DMK Construction LLP
Zh.A. Zharasov
Republic of Kazakhstan,
20/2 Satpayev Street, Apt. 56, Astana, Kazakhstan.



Expert opinion

on the Educational Program 7M07188 «Automation and Control» within the field of training 7M071 Engineering and Engineering Trades

ZHOVA LTD LLP, Taraz, Republic of Kazakhstan

The Educational Program 7M07188 "Automation and Control" is aimed at training highly qualified researchers and engineering professionals capable of conducting fundamental and applied research in the fields of automated control systems, intelligent technologies, and digital modeling of complex industrial processes.

Relevance of the Program

The relevance of the program is determined by the following factors:

Advancement of research in automation. The implementation of modern digital control methods, mathematical modeling techniques, and machine learning algorithms requires in-depth scientific research and development.

Global trends in automation and digitalization. The Industry 4.0 paradigm creates demand for intelligent manufacturing systems, digital twins, and predictive control technologies.

The need for research-based approaches in industry. Industrial enterprises require scientifically grounded automation strategies to improve efficiency, energy performance, and reliability of technological processes.

Government support for scientific research. National initiatives aimed at digital transformation and scientific development promote research activities in intelligent control systems and automation technologies.

Master's students have opportunities to participate in funded research projects, international conferences, and academic internships, facilitating the integration of Kazakhstan's scientific achievements into the global research community.

Description and Evaluation of the Program Structure

The program consists of the following components:

Core disciplines – 30 credits;

Major disciplines – 48 credits;

Research work – 24 credits;

Professional internship – 10 credits;

Final assessment – 8 credits.

The total workload amounts to 120 credits.

Partner organizations, including GSCVEN LLP, provide industrial and research facilities for testing and implementing advanced automation methods, digital monitoring technologies, and intelligent control systems. This collaboration enables students to combine academic knowledge with practical industrial applications and real-world engineering challenges.

General Conclusion

The Educational Program 7M07188 "Automation and Control" is designed to prepare researchers and specialists capable of developing and implementing innovative automation and digitalization technologies across various sectors of industry. The

Therefore, the Educational Program 7M07188 "Automation and Control" is recommended for implementation in the educational process of K. Kulazhanov Kazakh University of Technology and Business.

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Expert opinion

on the Educational Program 7M07188 «Automation and Control» within the field of training 7M071 Engineering and Engineering Trades

«ADAL SISTEM» LLP

Republic of Kazakhstan, Rudny

The Educational Program 7M07188 "Automation and Control" is designed to prepare highly qualified master's graduates with advanced knowledge and research competencies in automated control systems, digital technologies, intelligent data processing, and industrial process modeling.

Relevance of the Program

The relevance of the program is determined by current trends in industrial and scientific development:

Development of automated industries. Modern enterprises are actively implementing digital technologies, automated control systems, and process monitoring tools, creating a demand for a new generation of specialists.

Transition to the digital economy. The implementation of Industry 4.0 and Smart Factory concepts requires the use of intelligent control systems, digital twins, and artificial intelligence technologies to improve production efficiency.

Demand for research personnel. Industrial enterprises need specialists capable of conducting scientific research, developing advanced process control methods, and implementing innovative engineering solutions.

Government support for innovation and research. The development of science and technology is one of the strategic priorities of the Republic of Kazakhstan, creating favorable conditions for research activities and the training of highly qualified professionals.

Master's students participate in research projects, publish scientific results, and present their findings at national and international conferences.

Description and Evaluation of the Program Structure

The educational program includes:

- Core disciplines – 30 credits;
- Major disciplines – 48 credits;
- Research work – 24 credits;
- Professional internship – 10 credits;
- Final assessment – 8 credits.

The total workload of the program is **120 credits**.

Partner enterprise **Astana Ceramics LLP** provides master's students with opportunities to conduct research in a real industrial environment. The company's production facilities enable studies in process automation, equipment monitoring, energy efficiency improvement, and optimization of industrial systems. The involvement of enterprise specialists in the educational process strengthens the practical orientation of training and enhances the quality of research activities.

General Conclusion

The Educational Program **7M07188 "Automation and Control"** provides comprehensive training for specialists with strong theoretical knowledge and practical research skills in automation and digital technologies. The program meets contemporary requirements of science, education, and industry and contributes to the preparation of competitive professionals for high-tech sectors of the economy.

Therefore, the Educational Program **7M07188 "Automation and Control"** is recommended for implementation in the educational process of **K. Kulazhanov Kazakh University of Technology and Business**.

Chief Engineer
ADAL SISTEM LLP
Rudny, Republic of Kazakhstan
Building 10, Kosmanatov Avenue



Y. Lavrentyev

Expert Opinion

on the Educational Program 7M07188 «Automation and Control» within the
field of training 7M071 Engineering and Engineering Trades

Kyrgyz State University named after I. Arabaev
Bishkek, Kyrgyz Republic

General Characteristics of the Educational Program

The educational program “6B06155 Artificial Intelligence” has been developed in accordance with the requirements of the National Qualifications Framework of the Republic of Kazakhstan, sectoral qualification requirements, and modern professional standards in the field of information and communication technologies and artificial intelligence.

The implementation of this educational program is driven by the rapid development of artificial intelligence technologies and their widespread adoption across various sectors of the economy. Modern organizations require specialists capable of developing intelligent software products, analyzing large volumes of data, creating decision support systems, and applying machine learning methods to solve practical problems. The training of professionals in the field of artificial intelligence aligns with the strategic directions of digitalization in the Republic of Kazakhstan and global trends in technological development.

The aim of the educational program is to prepare competitive specialists with modern knowledge in the fields of artificial intelligence, data analytics, software engineering, and intelligent information systems, capable of effectively performing professional activities in the digital economy.

A distinctive feature of the program is the integration of fundamental knowledge in mathematics, computer science, and programming with advanced technologies in machine learning, deep learning, computer vision, natural language processing, and data mining. The educational program is focused on developing practical skills in designing and implementing intelligent solutions that are highly demanded in today's labor market.

Description and Evaluation of the Educational Program Structure

The structure of the educational program complies with the requirements of higher education and ensures the consistent development of students' competencies through the study of general education, basic, and major-specific disciplines.

Fundamental training includes courses in mathematics and information technologies that provide the theoretical foundation for mastering artificial intelligence technologies. Students acquire knowledge in algorithms and data structures, mathematical statistics, programming, databases, computer systems, and network technologies.

The major component of the program is focused on the study of modern artificial intelligence methods, including machine learning, deep neural networks, data mining, natural language processing, computer vision, big data technologies, cloud computing, and information security of intelligent systems.

The content of the disciplines is aligned with the professional competencies of graduates and ensures the development of skills in creating AI-based software solutions, analyzing data, and building intelligent models for solving applied problems of varying complexity.

The organization of professional internships contributes to the acquisition of practical experience in the development and implementation of intelligent technologies, working with real datasets, using specialized software platforms, and performing tasks closely related to professional practice. The content of internships corresponds to the program profile and promotes the development of both professional and research competencies among students.

One of the key advantages of the educational program is its focus on practice-oriented learning, which includes project-based activities, participation in research work, professional

internships, and collaboration with employers. This approach ensures a high level of specialist training and enhances graduates' competitiveness in both national and international labor markets.

Based on the analysis of the educational program's content, structure, objectives, learning outcomes, and its compliance with modern higher education requirements, it can be concluded that the implementation of this program is highly appropriate. The educational program "6B06155 Artificial Intelligence" meets the current demands of the labor market, provides high-quality professional training for students, and is recommended for implementation and further development within the educational process of K. Kulazhanov Kazakh University of Technology and Business.

General Conclusion

The educational program “6B06155 Artificial Intelligence” meets modern higher education requirements and is aimed at training specialists who are highly востребованы in the context of the digital transformation of the economy and society.

The content of the program reflects current trends in the development of artificial intelligence, takes into account employers' needs, and contributes to the formation of professional competencies necessary for successful careers in information technology, data analytics, and intelligent systems.

Considering the relevance of the educational program, its practical orientation, compliance with modern scientific and technological trends, and labor market requirements, the educational program “6B06155 Artificial Intelligence” is recommended for implementation in the educational process of K. Kulazhanov Kazakh University of Technology and Business.

Expert:

Full Name, Position, Academic Degree

B.I. Biybosunov, Head of the Department of Applied Informatics, Professor, Doctor of Technical Sciences, Doctor of Physical and Mathematical Sciences

I. Arabaev Kyrgyz State University

Organization:

Signature:

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Date:

