



EDUCATIONAL PROGRAM

6B07 - Engineering, Manufacturing and Civil engineering
(Code and classification of the field of education)

6B071 - Engineering and engineering trades
(Code and classification of the direction of training)

0710
(Code in the International Standard Classification of Education)

B063 - Electrical Engineering and Automation
(Code and classification of the educational program group)

6B07104 - Automation and control
(Code and name of the educational program)

Bachelor
(Level of preparation)

Semey

Educational program

6B07 – Engineering, manufacturing and construction industries
(Code and classification of the field of education)

6B071 - Engineering and Engineering affairs
(Code and classification of the direction of training)

0710
(Code in the International Standard Classification of Education)

B063 - Electrical Engineering and Automation
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6B07104 - Automation and Control
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PREFACE

Developed

The educational program 6B07104 - Automation and Control in the direction of preparation 6B071 - Engineering and Engineering affairs on the basis of the State Compulsory Standards of Higher and Postgraduate Education approved by the Order of the Ministry of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No 2 (as amended by the order) was developed by the Academic Committee dated 20.02.2023 No 66).

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Reviewed

at the meeting of the Commission on Academic Quality of the Faculty of Engineering and Technology
Protocol No. 3 January 15, 2024

at the meeting of the Commission on Academic Quality of the Higher School of Artificial Intelligence and Construction

Recommended for approval by the Academic Council of the University
Protocol No. 1, "6" June 2024

Approved

at a meeting of the University Academic Council by protocol No. 6/1 of January 19, 2024.

at a meeting of the University Academic Council by protocol No. 11 of June 28, 2024.

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1.Introduction

1.1.General data

Training according to the educational program 6B07104 "Automation and control" is carried out at the department of "IT technologies" of the Graduate School Artificial Intelligence and Construction of the "Shakarim Semey University". The developers are both teachers of the department who have extensive professional experience both in the scientific and pedagogical sphere and in production, as well as stakeholders interested in obtaining specialists of this profile. Having mastered this educational program, graduates acquire the skills and abilities of theoretical and experimental research in complex engineering activities in the field of automation and control; apply progressive methods of operation of automation and control systems equipment, apply modern methods for the development of energy-saving and environmentally friendly automation and control systems that ensure the safety of human life and their protection from possible consequences of accidents, catastrophes and natural disasters, gain knowledge and skills focused on the creation of robots and robotic systems with elements of artificial intelligence. The novelty of this program is its content uniqueness, which consists in the ability to combine the design and programming in one course of both control systems built on a modern element base, and the study of mechatronics-an applied science engaged in the development and operation of intelligent automated technical systems for their implementation in various spheres of human activity. Graduates of this educational program will master the latest design tools and methods, such as methods of artificial intelligence, digital information processing, modeling of complex dynamic systems, and many others.

When implementing the educational program, it is planned to use artificial intelligence tools in the educational process, thereby developing digital competencies among students in a rapidly changing technological environment.

The educational program provides for the education of a student with special educational needs in the conditions of a higher educational institution, as well as his socialization and integration into society.

1.2.Completion criteria

The main criterion for the completion of the educational process in the preparation of bachelors is the acquisition of at least 205 credits of theoretical training, as well as at least 27 credits of practice, not 8 credits for the preparation of diplomas. Total 240 credits.

1.3.Typical study duration: Duration of training: 4 years

2.PASSPORT OF THE EDUCATIONAL PROGRAM

2.1.EP purpose	The development of students theoretical knowledge and practical skills that allow graduates to understand and apply fundamental and advanced knowledge to monitor and control technological processes and production and to formulate and solve engineering problems
2.2.Map of the training profile within the educational program	
Code and classification of the field of education	6B07 - Engineering, manufacturing and construction industries
Code and classification of the direction of training	6B071 - Engineering and Engineering affairs
Code in the International Standard Classification of Education	0710
Code and classification of the educational program group	B063 - Electrical Engineering and Automation
Code and name of the educational program	6B07104 - Automation and Control
2.3.Distinctive features of the OP (double degree/joint, OVPO-partner, Double major, innovative)	The EP was developed jointly with stakeholders and reflects modern achievements in the field of automation and robotics
2.4.Qualification characteristics of the graduate	
Degree awarded / qualification	Bachelor of Engineering and Technology in the educational program-Automation and Control
Name of professional standard	1. Operation and repair of thermal automation and measuring instruments 2. Maintenance, installation and commissioning of electrical equipment 3. Metrology 4. Robotics
Atlas of new professions	no
Regional standard	no
Name of the profession / list of positions of a specialist	- positions of managers - the master of the site, the head of the shop (site), the producer of works, the master of the shop, the shift supervisor, the head (head of the workshop); - positions of specialists - design engineer, laboratory engineer, production management engineer, equipment commissioning and operation engineer, software engineer. - positions of senior, scientific and technical employees, common for research, design, technological, design organizations: technician, laboratory assistant, design engineer
OQF qualification level (industry qualification framework)	6
Area of professional activity	Graduates are prepared to work in the field of automation, informatization and management in technical systems, technological systems, systems related to the use of information processing tools and methods for management in all areas of production
Object of professional activity	Automated control systems for technological processes of various industries, automated information and control systems for various purposes,

	<p>automated systems for receiving, processing and transmitting data for various purposes, automated systems for designing systems, objects, devices, automated systems for technological preparation of production of various industries, automated systems for complex testing of parts, products, assemblies, devices in various industries.</p>
Types of professional activity	<ul style="list-style-type: none"> - service and operational; - production and technological; - organizational and managerial; - design and engineering.
2.5. Graduate Model	<p>Graduate Model OP 6B07104 "Automation and control"</p> <p>According to the results of the training, the student receives:</p> <p>1. Professional competencies:</p> <ul style="list-style-type: none"> - To develop control algorithms and their software and hardware for control systems; - To apply in practice the justification for the choice of regulated, controlled, signaled parameters and to assess the technical means of automation and control; - Explain the principles of organization and architecture of automatic and automated control and management systems for objects and processes in various sectors of the national economy; - To evaluate the methods of analysis of computational and information processes related to the functioning of automation and control systems software; - Develop algorithmic and software tools and systems for automation and process control; - Apply the physical and mathematical apparatus to solve computational and analytical problems arising in the course of professional activity; - To choose methods, develop decision-making algorithms and modify hardware and software of nodes and devices of mobile communication systems, - to use the basic laws of natural science disciplines in professional activity, to apply methods of mathematical analysis and modeling, theoretical and experimental research; - use specialized software to solve the tasks of managing technological objects; - to choose tools when designing control automation systems, to program and debug systems based on microcontrollers; - to use optimal standards of measurement accuracy and control reliability, to choose technical means of automation, control, diagnostics, testing and process management; - To use in practice the principles, methods and methods of integrating hardware and software when creating automation and control systems; - To evaluate the issues of the use of electrical equipment in the means and methods of measuring electrical quantities.

- To use the fundamental principles of building control systems, classification of systems according to the main algorithmic features and corresponding algorithmic schemes, to determine the advantages and disadvantages of closed and open systems, the role of feedback in control systems;
- Develop models of technological processes, production facilities, automation tools and systems, control, diagnostics, testing and process management, product lifecycle and quality using modern computer-aided design tools;
- to use the basic laws of natural science disciplines in professional activity, to apply methods of mathematical analysis and modeling, theoretical and experimental research;
- to use technological and functional standards, modern models and methods for assessing quality and reliability in the design, construction and debugging of automatic control and control systems, to determine the tasks of optimal control of technological processes using a computer;
- Apply methods for calculating control systems based on linear and nonlinear continuous and discrete models under deterministic and random influences.
- to assemble automation tools for technological processes and productions;
- Possess the basic methods, methods and means of obtaining, storing, processing information, work with a computer as a means of information management;
- to carry out a study of the stability, accuracy and quality of control processes, to develop control algorithms and their hardware and software;
- to conduct research and analysis of mathematical models of robotic and mechatronic systems using methods of automatic control theory, computer technology and modern software.

2 Personal qualities of the graduate

- has a culture of thinking, is capable of generalization, analysis, perception of information, setting goals and choosing ways to achieve it;
- can logically correctly, argumentatively and clearly build oral and written speech;
- is able to find organizational and managerial solutions in non-standard situations and is ready to take responsibility for them;
- is able to use regulatory legal documents in its activities;
- strives for self-development, improvement of their qualifications and skills;
- is able to critically evaluate its advantages and disadvantages, outline ways and choose means of developing advantages and eliminating disadvantages;
- is aware of the social significance of his future profession, has a high motivation to perform professional activities;
- uses the basic laws of natural science disciplines in professional activity, applies methods of

	<p>mathematical analysis and modeling, theoretical and experimental research;</p> <ul style="list-style-type: none">- speaks one of the foreign languages at a level not lower than spoken;- is able to use, generalize and analyze information, set goals and find ways to achieve them in the conditions of formation and development of the information society; <p>he is able to logically correctly, argumentatively and clearly build oral and written speech, possess the skills of conducting discussions and polemics.</p>
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3.Modules and content of the educational program

Module 1. Fundamentals of social and humanitarian knowledge

Brief description of the module content

This module reveals such aspects as: socio-cultural, economic-legal, environmental knowledge, communication skills, the use of information technology taking into account modern trends in the development of society.

Module disciplines

Foreign language

Kazakh(Russian) language (1)

Bases of economics, law and ecological knowledge

Physical Culture

Mathematics

Foreign language

History of Kazakhstan

Kazakh(Russian) language (2)

The module of socio-political knowledge (sociology, political science, cultural studies, psychology)

Physical Culture

Physical Culture

World of Abai

Information and communication technology

Physical Culture

Philosophy

Organization and planning of production

Cost management

Economics of enterprise

Module 2. Microelectronic devices

Brief description of the module content

He is proficient in various types of design and principle of operation of microelectronic devices

Module disciplines

CAD microelectronic circuits.

CAD of microelectronic devices

Technology of installation in microelectronics

Interfaces of robotic systems

Development of user interfaces.

Data transmission systems and automation and control interfaces

PIC Microcontrollers

Programmable logic controllers

Industrial Controls

Module 3. Microcontrollers in control systems

Brief description of the module content

Develops algorithms for the operation and software of microcontrollers in control systems.

Module disciplines

Microelectronics

Nanoscale electronic devices and novel simulation techniques

Verification of the property of microelectronic components and devices by impedance spectroscopy.

Software for microcontrollers and industrial controllers

Module 4. Theoretical bases of control systems.

Brief description of the module content

Studies the basic principles and methods of building control systems

Module disciplines

Introduction to the profession

Theoretical bases electrical engineers

Educational practice

Automation of heattechnical processes and installation.

Methods of optimization of technological process management

Optimal control system

Modeling and identification of objects of management

Industrial practice 1

Methods of scientific research

Methods and means of scientific research

Processing of experimental data

Module 5. Receiving, processing and transmitting information.

Brief description of the module content

He knows the basic principles and devices for processing and transmitting information

Module disciplines

Metrology and measurement

Technical means of automation and control

Fundamentals of Information Processes

Basics of collecting and information transfer

Applied Information Theory

Linear systems of automatic control

Diagnostics and reliability of control systems

Diagnostics and reliability of components and systems automation

Information and Control Systems. (course work)

The reliability of control systems.

Cloud technologies in automation

Application of mobile systems for remote control

Software and hardware complexes management

System modeling software

Industrial practice 2

Remote control of the Arduino platform

Nonlinear systems of automatic control

Wireless control systems

Computer networks

Local Area Networks

Installation, commissioning and operation of tools and automation systems

Technologies and Applications of Superconductive Materials

Packaging technologies in microelectronics

Prediploma practice

Production practice 3

Module 6. Mechatronics and robotics.

Brief description of the module content

He knows the methods of developing robots and robotic control systems.

Module disciplines

Computer graphics and bases of ADS

Fundamentals of engineering and computer graphics

Systems of design automation

Dispatch control system

Control methods intelligent systems

Fundamentals of programming mobile systems

Application software of control systems

Programming of mobile applications for Java

Mobile device programming

PCS Software.

Robotic systems and complexes with the basics of artificial intelligence.

Electronic devices of robotic systems

Information devices and systems in mechatronics

Information devices of robotic systems

Design of systems based on programmable logic integrated circuits

Automation of industrial plants and facilities

Automation of typical technological and logical processes

Automation of typical technological processes.

Automated electric drive

The hardware of the Internet of Things

Executive systems of industrial robots

Internet of Things software platforms

Design of automated systems

Design of automation and remote control systems

Design, installation, commissioning and maintenance of automation systems

System of electric drive control

Internet of Things technologies

Final examination**Brief description of the module content**

Writing and defending a graduation project or preparing and passing a comprehensive exam.

Module disciplines

Thesis project

Comprehensive exam

4.Summary table on the scope of the educational program «6B07104 - Automation and Control»

Name of discipline	Cycle/ Component	Term	Number of credits	Total hours	Lec	SPL	LC	IWST	IWS	Knowledge control form
Module 1. Fundamentals of social and humanitarian knowledge										
Foreign language	GER/CC	1	5	150		45		35	70	Examination
Kazakh(Russian) language (1)	GER/CC	1	5	150		45		35	70	Examination
Bases of economics, law and ecological knowledge	GER/US	1	5	150	15	30		35	70	Examination
Physical Culture	GER/CC	1	2	60		60				Differentiated attestation
Mathematics	BS/US	1	5	150	15	30		35	70	Examination
Foreign language	GER/CC	2	5	150		45		35	70	Examination
History of Kazakhstan	GER/CC	2	5	150	15	30		35	70	Qualification examination
Kazakh(Russian) language (2)	GER/CC	2	5	150		45		35	70	Examination
The module of socio-political knowledge (sociology, political science, cultural studies, psychology)	GER/CC	2	8	240	30	45		55	110	Examination
Physical Culture	GER/CC	2	2	60		60				Differentiated attestation
Physical Culture	GER/CC	3	2	60		60				Differentiated attestation
World of Abai	BS/US	3	3	90	15	15		20	40	Examination
Information and communication technology	GER/CC	4	5	150	15	15	15	35	70	Examination
Physical Culture	GER/CC	4	2	60		60				Differentiated attestation
Philosophy	GER/CC	5	5	150	15	30		35	70	Examination
Organization and planning of production	BS/CCh	7	3	90	15	15		20	40	Examination
Cost management	BS/CCh	7	3	90	15	15		20	40	Examination
Economics of enterprise	BS/CCh	7	3	90	15	15		20	40	Examination
Module 2. Microelectronic devices										
CAD microelectronic circuits.	BS/CCh	3	3	83	15		8	20	40	Examination
CAD of microelectronic devices	BS/CCh	3	3	83	15		8	20	40	Examination
Technology of installation in microelectronics	BS/CCh	3	3	83	15		8	20	40	Examination
Interfaces of robotic systems	AS/CCh	4	5	150	15	30		35	70	Examination
Development of user interfaces.	AS/CCh	4	5	150	15	30		35	70	Examination
Data transmission systems and automation and control interfaces	AS/CCh	4	5	150	15	30		35	70	Examination
PIC Microcontrollers	BS/CCh	5	5	150	15	15	15	35	70	Examination

Programmable logic controllers	BS/CCh	5	5	150	15	15	15	35	70	Examination
Industrial Controls	BS/CCh	5	5	150	15	15	15	35	70	Examination
Module 3. Microcontrollers in control systems										
Microelectronics	BS/US	3	5	150	15	15	15	35	70	Examination
Nanoscale electronic devices and novel simulation techniques	BS/CCh	4	5	150	15		30	35	70	Examination
Verification of the property of microelectronic components and devices by impedance spectroscopy.	BS/CCh	4	5	150	15		30	35	70	Examination
Software for microcontrollers and industrial controllers	BS/CCh	4	5	150	15		30	35	70	Examination
Module 4. Theoretical bases of control systems.										
Introduction to the profession	BS/US	1	3	90	15	15		20	40	Examination
Theoretical bases electrical engineers	BS/US	2	5	150	15	15	15	35	70	Examination
Educational practice	BS/US	2	2	60						Total mark on practice
Automation of heattechnical processes and installation.	BS/CCh	3	5	150	15	30		35	70	Examination and term work/Project
Methods of optimization of technological process management	BS/CCh	3	5	150	15	30		35	70	Examination and term work/Project
Optimal control system	BS/CCh	3	5	150	15	30		35	70	Examination and term work/Project
Modeling and identification of objects of management	BS/US	4	5	150	15	30		35	70	Examination
Industrial practice 1	BS/US	4	5	150						Total mark on practice
Methods of scientific research	AS/CCh	7	3	90	15	15		20	40	Examination
Methods and means of scientific research	AS/CCh	7	3	90	15	15		20	40	Examination
Processing of experimental data	AS/CCh	7	3	90	15	15		20	40	Examination
Module 5. Receiving, processing and transmitting information.										
Metrology and measurement	BS/US	3	5	150	15	15	15	35	70	Examination
Technical means of automation and control	BS/US	3	5	150	15	15	15	35	70	Examination
Fundamentals of Information Processes	BS/CCh	4	5	143	15	15	8	35	70	Examination
Basics of collecting and information transfer	BS/CCh	4	5	143	15	15	8	35	70	Examination
Applied Information Theory	BS/CCh	4	5	143	15	15	8	35	70	Examination
Linear systems of automatic control	AS/US	5	5	150	15	15	15	35	70	Examination
Diagnostics and reliability of control systems	BS/CCh	6	5	150	15	30		35	70	Examination
Diagnostics and reliability of components and systems automation	BS/CCh	6	5	150	15	30		35	70	Examination
Information and Control Systems. (course work)	BS/CCh	6	5	143	15	15	8	35	70	Examination and term work/Project
The reliability of control systems.	BS/CCh	6	5	150	15	30		35	70	Examination

Cloud technologies in automation	BS/CCh	6	5	150	15	30		35	70	Examination
Application of mobile systems for remote control	BS/CCh	6	5	150	15	30		35	70	Examination
Software and hardware complexes management	BS/CCh	6	5	143	15	15	8	35	70	Examination and term work/Project
System modeling software	BS/CCh	6	5	143	15	15	8	35	70	Examination and term work/Project
Industrial practice 2	BS/US	6	5	150						Total mark on practice
Remote control of the Arduino platform	BS/CCh	6	5	150	15	30		35	70	Examination
Nonlinear systems of automatic control	AS/US	6	5	150	15	15	15	35	70	Examination
Wireless control systems	AS/CCh	7	5	150	15	15	15	35	70	Examination
Computer networks	AS/CCh	7	5	150	15	15	15	35	70	Examination
Local Area Networks	AS/CCh	7	5	150	15	15	15	35	70	Examination
Installation, commissioning and operation of tools and automation systems	AS/CCh	7	5	165	15	30	15	35	70	Examination
Technologies and Applications of Superconductive Materials	AS/CCh	7	5	165	15	30	15	35	70	Examination
Packaging technologies in microelectronics	AS/CCh	7	5	165	15	30	15	35	70	Examination
Prediploma practice	AS/CCh	8	15	450						Total mark on practice
Production practice 3	AS/CCh	8	15	450						Total mark on practice
Module 6. Mechatronics and robotics.										
Computer graphics and bases of ADS	BS/CCh	1	3	90	15	15		20	40	Examination
Fundamentals of engineering and computer graphics	BS/CCh	1	3	90	15	15		20	40	Examination
Systems of design automation	BS/CCh	1	3	90	15	15		20	40	Examination
Dispatch control system	BS/CCh	5	5	150	15	30		35	70	Examination and term work/Project
Control methods intelligent systems	BS/CCh	5	5	135	15		15	35	70	Examination
Fundamentals of programming mobile systems	BS/CCh	5	5	150	15	30		35	70	Examination
Application software of control systems	BS/CCh	5	5	150	15	30		35	70	Examination and term work/Project
Programming of mobile applications for Java	BS/CCh	5	5	150	15	30		35	70	Examination
Mobile device programming	BS/CCh	5	5	150	15	30		35	70	Examination
PCS Software.	BS/CCh	5	5	150	15	30		35	70	Examination and term work/Project
Robotic systems and complexes with the basics of artificial intelligence.	BS/CCh	5	5	135	15		15	35	70	Examination
Electronic devices of robotic systems	BS/CCh	5	5	135	15		15	35	70	Examination
Information devices and systems in mechatronics	BS/CCh	6	5	150	15	30		35	70	Examination
Information devices of robotic systems	BS/CCh	6	5	150	15	30		35	70	Examination

Design of systems based on programmable logic integrated circuits	BS/CCh	6	5	150	15	30		35	70	Examination
Automation of industrial plants and facilities	AS/CCh	7	6	180	15	15	30	40	80	Examination and term work/Project
Automation of typical technological and logical processes	AS/CCh	7	6	180	15	15	30	40	80	Examination and term work/Project
Automation of typical technological processes.	AS/CCh	7	6	180	15	15	30	40	80	Examination and term work/Project
Automated electric drive	AS/CCh	7	5	143	15	15	8	35	70	Examination
The hardware of the Internet of Things	AS/CCh	7	5	150	15	30		35	70	Examination
Executive systems of industrial robots	AS/CCh	7	5	143	15	15	8	35	70	Examination
Internet of Things software platforms	AS/CCh	7	5	150	15	30		35	70	Examination
Design of automated systems	AS/CCh	7	5	150	15	30		35	70	Examination and term work/Project
Design of automation and remote control systems	AS/CCh	7	5	150	15	30		35	70	Examination and term work/Project
Design, installation, commissioning and maintenance of automation systems	AS/CCh	7	5	150	15	30		35	70	Examination and term work/Project
System of electric drive control	AS/CCh	7	5	143	15	15	8	35	70	Examination
Internet of Things technologies	AS/CCh	7	5	150	15	30		35	70	Examination
Final examination										
Thesis project		8	8	240						
Comprehensive exam		8	8	240						

NON -PROFIT LIMITED COMPANY «SHAKARIM UNIVERSITY OF SEMEY»

EDUCATION PROGRAM DEVELOPMENT PLAN

6B07104 Automation and control

for the period 2024-2028

Semey 2024

Content

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1. Passport of the Bachelor's/Master's Degree Educational Program Development Plan 6B07104 Automation and control

1	The basis for the development	Development program of the Non -Profit Limited Company «Shakarim University of Semey» for 2023-2029 School work plan
2	Terms of implementation	2024-2028 y
3	Expected results of implementation	Having mastered this educational program, graduates acquire the skills and abilities of theoretical and experimental research in complex engineering activities in the field of automation and control; apply progressive methods of operation of automation and control systems equipment, apply modern methods to develop energy-saving and environmentally friendly automation and control systems that ensure the safety of human life and their protection from possible consequences of accidents, disasters and natural disasters, gain knowledge and skills focused on the creation of robots and robotic systems with elements of artificial intelligence.

2. Analytical justification of the educational program

2.1 Information about the educational program

The educational program has been developed in accordance with the National Qualifications Framework and Professional Standards, according to the Dublin Descriptors and the European Qualifications Framework. The term of mastering the bachelor's degree program is 4 years.

The main criterion for the completion of the educational process is the development of at least 240 credits, with the award of a Bachelor of Engineering and Technology degree in the educational program – Automation and Control.

The novelty of this program is its substantial uniqueness, which consists in the ability to combine the design and programming in one course of both control systems built on a modern element base, and the study of mechatronics – an applied science engaged in the development and operation of intelligent automated technical systems for their implementation in various spheres of human activity. Graduates of this educational program will master the latest means and methods of design, such as methods of artificial intelligence, digital information processing, modeling of complex dynamic systems and many others

2.2 Information about students

Academic year The basis of training	2024-2025 academic year	2025-2026 academic year	2026-2027 academic year	2027-2028 academic year
Grant	50	50	50	60
Contract	20	20	20	20
Total	70	70	70	80

2.3 Internal and external conditions for the development of the educational program

To implement the above-mentioned purpose of the educational program, the department has the appropriate material and technical resources. 14 classrooms are involved: 1 lecture hall, equipped with an LSD projector and an interactive whiteboard, 5 computer classes with a LAN connection and unlimited Internet, 6 specialized laboratories. Thus, to date, the classroom fund of the department is sufficient for the successful implementation of the educational program plan, only it is necessary to improve the equipment

To attract students to research activities, there is a specialized laboratory (700 aud), which allows consolidating efforts to carry out scientific research. The financial resources of the educational program are provided by the university budget, as well as research and international projects. Information resources are at the disposal of the educational program and are represented by the library (including electronic publications), access to the Internet for all students and teaching staff, access to the local network of the university. There are open WI-FI zones. The personnel of the educational program is fully staffed, according to the educational program development plan, the provision of educational programs with educational and methodological complexes of disciplines is 100%. The work on mobility has been well done: Cooperation between Kazakh Universities has been expanded (NCSU, Gumilev ENU, EKTU named after Serikbayeva, Pavlodar State University. Toraighyrova, as a result of working on the project, it was possible to conclude memoranda and cooperation agreements with leading EU universities.

During the development of the educational program, employers took part in its discussion: Director of RTS - montazh LLP Kdirbaev A.N., director of Reltech LLP Shpuntov E.V., director of Kondiz LLP Talia V.S. .

According to the educational program, contracts for practical training have been concluded with Kazpoligraf LLP, Kondiz LLP, Teplokommunenergo LLP, and Spetsmontazhavtomatika LLP.

According to the dual training program, an agreement has been signed with the Research Institute of Radiation Medicine and Ecology.

2.4 Information about teaching staff implementing the educational program

The staff of the teaching staff of the department for the 2024-2025 academic year is 15 people, including 5 people with academic degrees and titles. The number of full-time teaching staff with academic degrees and titles has been increasing in recent years. The teaching staff is being trained in the PhD doctoral program. In the 3rd year, one doctoral student is studying – T. Zhylkibaev, in the 1st year – two doctoral students. The personnel policy pursued by the management of the department and the university, which is aimed at creating conditions and assisting in admission to the target PhD-doctoral program, contributes to maintaining stability.

A number of teachers, such as Zolotov A.D., Kozhakhmetova D.O. have practical experience working at enterprises: associate professor Zolotov A.D. is an automation engineer at the Fedorovsky Gormolzavod of the Kostanay region, Kozhakhmetova D.O. in the pile of a Flour mill and feed mill.

In order to improve the quality of teaching disciplines, the teachers of the department implementing the OP are activating the introduction and further application in the educational process of new information technologies, multimedia learning tools, active learning tools and e-learning elements, which enable students to better assimilate educational material and consolidate knowledge

The teaching staff leading classes in the educational program has the necessary qualifications and level of education.

The number of full-time teaching staff conducting training sessions on this OP is 29 people. Including those with academic degrees and titles – 17, which is 57% of the total number of teachers among the teaching staff - doctors of technical sciences, candidates of sciences, PhD, masters. Associate Professor Zolotov A.D.. – Corresponding member of the International Academy of Informatization. For the achievements achieved at the University, PhD, Associate Professor Zolotov A.D. was awarded the Shakarim medal, the diploma of the Minister of Education of the Republic of Kazakhstan Ye. Sagadieva, Diploma of the Ministry of Education Nurbek.S., Associate Professor Ospanov E.A. – Diploma of the Ministry of Education Nurbek.Senior lecturer Myasoedov D.V. was awarded a letter of thanks from the akim of the city of Semey.

2.5 Characteristics of educational program achievements

The main indicator of the effectiveness of the educational program is the proportion of employed graduates. The dynamics of the share of labor–built in recent years amounted to 90%, respectively, for the years 2018, 2019 – 100%, 2020 -75%, 2021 -89%, 2022-86%. The involvement of students in research is more than 65%. An important indicator of the relevance and relevance of educational programs, their compliance with modern trends in education is the academic mobility of students and teaching staff. In the direction of the development of academic mobility, students undergo scientific internships in foreign research centers: University of Economics, Bydgoszcz, Poland, Pamukkale University, Turkey. The university implements international projects in the field of education and science, such as: under the Erasmus+: KazDual program, on the introduction of dual education in Kazakhstan, under the Partnership Program of universities of the USA and Kazakhstan, the project "Improving Master's programs in Kazakhstan through the use of renewable energy technologies affecting poultry farming", where teachers participate educational program

3. The main objectives of the educational program development plan

For the effective implementation of the OP , the following tasks are defined:

:

- to provide a level of education that meets modern requirements to develop independent thinking, the ability to self-development and self-education;
- provide conditions that take into account the individual and personal characteristics of the student;
- to create a creative atmosphere by organizing a system of electives, elective courses, clubs, sports sections, paid educational services;
- to form a positive motivation of students for learning activities.
- continue work on the organization and formation of specialized training

- to form a creatively working team of teachers;
- improve the work of methodological associations;
- to organize the study, implementation and improvement of technology and methods of diagnostics of the quality of education;
- organize the publication of creative and scientific works of teachers;
- . continue teachers' studies on the use of information technologies in the educational process.
- to improve the organization of the educational process:
- to improve the interaction of academic disciplines on the basis of integration;
- develop differentiation of learning, technology of problem-based learning;
- to introduce technologies that form key competencies into the educational process.

Expected final results of the implementation of the educational program development plan

1. Improving the quality of education
2. Improving the efficiency of the education system, continuous professional growth of the teaching staff of the department;
3. Modernization of personnel, information and resource, material and technical potential;
4. The demand for graduates of the educational program in the labor market.

4. Risk analysis of the educational program

№	Name of risks	Measures to eliminate
1	Decrease in the number of students enrolled in the educational program	introduction of effective forms of career guidance (attracting startup students, meeting with parents of graduates at parent meetings, engaging in research, etc.); formation of a positive image of the OP (through the release of highly qualified specialists, the introduction of research results, etc.); improving the effectiveness of speaking in the media.
2	Insufficient level of knowledge of the language for the introduction of multilingualism	Opening of language courses
3	Decrease in the level of employment	Work on the development of dual education
4	Insufficient development of external and internal academic	Conclusion of contracts with domestic and foreign universities.

	mobility of students and teaching staff	
5	The risk of reducing the settling of the teaching staff according to the educational program	Personnel training through PhD - doctoral studies
6	In the field of supplementing the material and technical base with the requirements for the modern level of implementation of educational programs	In the field of supplementing the material and technical base with the requirements for the modern level of implementation of educational programs: the implementation of annual purchases of modern equipment, medium-term planning for the improvement of material and technical equipment; opening of new educational laboratories and classrooms. regular registration of applications for replenishment of the library fund; timely repair of educational laboratories.

5. Action plan for the development of the educational program


№	Criteria	Expected results	Ед. изм.	2024- 2025	2025- 2026	2026- 2027	2027- 2028
	Direction 1. Educational and methodological support						
1.1	Updating the educational program based on professional standards, taking into account the recommendations of employers	Conducting an examination of the Educational program "Automation and Management" in order to increase the practice orientation and development of professional competencies of graduates	факт		+		+

1.2	Monitoring and updating catalogs of elective disciplines in accordance with the development of key and professional competencies, the demands of the labor market.	Improving the quality of the content of educational programs by including elective courses aimed at developing the key and professional competencies of graduates in accordance with the demands of the labor market.	факт		+		+
1.3	Involvement of social partners and employers in the development, examination of the implementation of educational programs	Improving the quality of educational programs implemented taking into account market demands and recommendations of employers	ед	1	1	1	1
1.4	Development and implementation of elective courses in English	Introduction of disciplines in English into the educational process	ед		1	1	
1.5	Conducting seminars and round tables on the application of innovative technologies in the educational process	Introduction of innovative technologies in the educational process	ед	1		1	
1.6	Publication of educational, methodical and scientific literature on the implemented OP	Improvement of educational and methodological support in the disciplines of the implemented educational programs	ед	1	1	1	1
1.7	Inviting students from partner universities to study for a semester, short-term internships, internships, etc.	Development of international recognition of educational programs, implementation of academic mobility programs for students	чел	1	1	1	1
1.8	Participation of teaching staff and students in international academic exchange programs	Development of international cooperation with foreign universities implementing educational programs in the field of engineering	чел	1		1	


1.9	Development of outgoing academic mobility of teaching staff and students in the field of engineering	Improving the educational program based on the experience of implementing such programs in leading universities of the Republic of Kazakhstan	чел	1		1	
	Direction 2. Teaching staff						
2.1	Professional development and training of scientific and pedagogical personnel for the implementation of educational programs once every 5 years	The share of teaching staff who have passed advanced training at the national level is at least 20%	чел	2	2	2	1
2.2	Promotion of publications of the works of teaching staff in international publications indexed by the Web of Science and Scopus databases	Increase in the share of teaching staff who have published the results of scientific research in publications indexed by the Web of Science and Scopus databases – at least 10% of the total number of teaching staff	%	10	10	10	10
2.3	Involvement of practical specialists in teaching and scientific activities	Participation in the implementation of educational programs of practitioners (at least 10% of specialists)	%	10	10	10	10
	Direction 3. Internationalization of educational programs						
3.1	Conclusion of agreements on international cooperation with foreign universities	Implementation of joint projects, preparation of scientific publications with foreign partners, creation of bases for scientific internships of students	ед	1	1	1	1
3.2	Attracting foreign students to study under the educational program "Automation and Management"	Increasing the number of foreign students	чел	2	2	2	1

3.3	Organization of joint scientific and practical events with international partners	Improving the efficiency of scientific and methodological activities of teaching staff, exchange of experience with foreign partners	ед	1	1	1	1
3.4	Invitation of foreign specialists to give lectures and consultations on master's projects and dissertations	Improvement of the content component of educational programs based on the introduction of the experience of foreign specialists in the implementation of educational programs	ед		1		1
3.5	Expansion of cooperation with Leading foreign scientific and educational organizations in order to attract the most qualified foreign specialists to the implementation of educational programs	Formation of key and professional competencies in accordance with the practice of leading universities	чел	1		1	1
Direction 4. Logistics and digitalization							
4.1	Step-by-step equipment of classrooms with technical training tools (projectors, panels, interactive and multimedia whiteboards, multifunction devices, webcam, projector screen)	Equipping classrooms assigned to the department with technical training tools (projectors, panels, interactive and multimedia whiteboards, multifunctional devices, webcam, projector screen)	ед	1	1	1	1
4.2	Automation of the educational process (testing, session management, student contingent movement, dean's office, department, teaching staff workload, schedule, library, syllabuses)	Information management based on the automation of the educational process (testing, session management, student body movement, dean's office, department, workload of the teaching staff schedule, library, syllabuses)	факт	+	+	+	+

4.3	Replenishment of full-text base of results of scientific researches of teaching staff and students, teaching staff (articles, monographs, etc.)	Increase in the number of results of scientific works of scientists, research of teaching staff and students, teaching staff (articles, monographs, etc.)	ед	2	2	2	3
4.4	Expansion of the fund of scientific and educational literature, including on electronic media on ongoing educational programs	Ensuring the implementation of educational programmes on the basis of modern educational and information resources, including on electronic media	%	10	10	10	10
4.5	Monitoring the content and improvement of the Faculty's website	Formation of the faculty website on various aspects of the implementation of educational programs?	%	100	100	100	100

Head of the Department  Bekbayeva R.S.

REVIEWED

at the meeting of the Commission on Academic Quality
Graduate School Artificial Intelligence and Construction
Minutes of the meeting № 1 «06» 06. 2024
Chairman CAQ  Adylkanova A.Zh.

AGREED

Dean  Kozhahmetova D.O.
«06» 06. 2024