Institute of Automation and Information Technology
Department of Electronics, Telecommunications and Space Technologies

EDUCATIONAL PROGRAM
Electronic and Electrical Engineering

Code and classification of the field of education: 6B071 "Engineering, manufacturing and construction industries"
Code and classification of training areas: 6B071 "Engineering and engineering", B063 "Electrical Engineering and Automation"
NQF level: 6
SQF level: 6
Duration of study: 4 years
Amount of credits:240

Almaty 2025

The educational program "6B07104 Electronic and Electrical Engineering" was approved at a meeting of the Academic Council of KazNITU named after K.I. Satpayev.

Protocol №10 dated "06" March 2025

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

Protocol №4 dated "20" December 2024

The educational program 6B07104"Electronic and Electrical Engineering" was developed by the academic committee in the direction B063 "Electrical Engineering and Automation".

Name	Academic degree / academic title	Post	Place of work	Signature
Chairman of the Academic Committee:				
Y. Tashtay	Candidate of Technical Sciences p Associate professor	Head of the Department of Electronics, Telecommunications and Space Technologies	Kazakh National Research Technical University named after K.I. Satbayev. Mobile phone; 87017889799	
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| Ibadildin Yersultan Zhanatovich | | Student of 6B07112 "Electronic and Electrical Engineering" | КазНИТУ, Институт АиИТ, Кафедра ЭТиКТ | |
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KazNITU 703-05 Educational program

Content

List of abbreviations and designations

OP- Educational program

NQF– National Qualifications Framework

SQF– Sectoral qualifications framework

IoT– Internet of Things (Internet of Things)

FPGA– Field-Programmable Gate Array (Field-Programmable Gate Array)

DSP– Digital Signal Processing

MEMS– Micro-Electro-Mechanical Systems

NEMS– Nano-Electro-Mechanical Systems

LED– Light Emitting Diode

USB– Universal Serial Bus (Universal Serial Bus)

CAN– Controller Area Network (Control Area Network Interface)

Wi-Fi– Wireless Fidelity (Wireless Network)

LoRa– Long Range (Long Range Technology)

NB-IoT– Narrowband IoT (Narrowband Internet of Things)

MOSFET– Metal-Oxide-Semiconductor Field-Effect Transistor (Metal-Oxide-Semiconductor Field-Effect Transistor)

IGBT– Insulated Gate Bipolar Transistor (Insulated Gate Bipolar Transistor)

ADC/DAC– Analog-to-Digital Converter / Digital-to-Analog Converter

UART– Universal Asynchronous Receiver-Transmitter (Universal Asynchronous Receiver-Transmitter)

SPI– Serial Peripheral Interface

I2C– Inter-Integrated Circuit (Inter-component communication bus)

ERP– Enterprise Resource Planning (Enterprise Resource Planning System)

ACS-Automatic Control System

USDD- Unified System for Design Documentation

AutoCAD – Automatic Computer-Aided Design

Matlab – Matrix Laboratory

ESG – Environmental, Social, and Governance

TRIZ – Theory of Inventive Problem Solving

1. Description of the educational program

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

The professional activities of the program's graduates are aimed at the field of industrial and civil electrical engineering and electronics, basic elements of the Internet of Things and smart technologies.

The training of specialists in electronics and electrical engineering will be carried out according to the new educational program (EP) "Electronic and Electrical Engineering" - "Electronics and Electrical Engineering", which has two specializations: "Electronic Systems" and "Electrotechnical Devices".

The content of the disciplines of the educational program was developed taking into account the relevant educational programs of the world's leading universities and the international classifier of professional activities in the field of electronics and electrical engineering.

The types of professional activity are: production and technological; service and operational; organizational and managerial; installation and adjustment; calculation and design; experimental and research.

The subjects of professional activity are systems that include: development, design of the element base of electronics and electrical engineering, including intelligent systems for the digital economy sectors using programmable logic integrated circuits, sensors and converters.

2. The purpose and objectives of the educational program

The purpose of the EP: The goal of the program is to train highly qualified specialists in the field of digital electronics, electrical engineering and automation, possessing deep knowledge, skills and practical abilities that ensure high-quality performance of functional duties in the chosen specialty, mobility in the professional labor market, and knowledge of the latest global achievements and development prospects of the electronic and electrical engineering industry.

Responsibilities of the EP:

- -Mastering a cycle of general education disciplines to ensure social and humanitarian education based on the laws of social and economic development of society, history, state and foreign languages, as well as modern information technologies.
- Study of a cycle of basic disciplines to form the basis of professional training in the field of natural, general technical and economic sciences.
- Developing skills in conducting scientific research in the field of electronics, optoelectronics and nanophotonics, as well as mastering the development of intelligent systems and their application in electronic engineering.
- Acquisition of theoretical knowledge and development of practical skills in microprocessor complexes designed to control processes in engineering automated control systems and information and communication systems.

- Providing students with knowledge of modern engineering technologies, intelligent microprocessor systems, design of analog and digital circuits, their key aspects and applications.
- Formation of competencies necessary for work in research and innovation centers, in high-tech industries, as well as in the field of scientific and pedagogical activities.
- Developing the ability to assess, analyze and solve production problems, monitor and manage technological processes.

The EP allows for the successful implementation of the Bologna Process principles. Based on the students' choice and independent planning of the sequence of studying disciplines, they independently form their individual curriculum (IEP) for each semester with the help of an advisor based on the educational program and the catalog of elective disciplines.

The educational program has increased the volume of mathematical, natural science, basic and language disciplines.

The following disciplines are studied: "Introduction to Electronic Science and Engineering Technologies", "Physical Foundations of Electronics", "Signal Transmission Theories", "Circuitry of Electronic Devices", "Microprocessor and Microcontroller Devices and Systems", "Theoretical Foundations of Electrical Engineering", "Electrotechnical Materials", "Basics of Power Electronics", "Ultraviolet Electronics", "Linear Automatic Control Systems", "Electronic Sensors and Converters", "Optoelectronics", "Programmable logic integrated circuits", "Intelligentnetworks", "Design of electronic means", etc.

In addition, attention is paid to modern trends in the development of electronics and electrical engineering in the field of artificial intelligence, reliability of electrical and electronic devices.

Students will undergo practical training in such companies as JSC Saiman, JSC Transtelecom, JSC ALTEL, JSC KazTransCom, LLP Kar-Tel, ASKB Alatau, branches of LG, Cisco, Rochde&Schwarz, LLP IKTT, LLP Kazakhstan ASELSAN Engineering, etc., as well as at the basic service centers of large international companies in the electronics industry.

Under the academic mobility program, the best students will study at leading foreign universities in the relevant program.

3. Requirements for the assessment of learning outcomes of the educational program

The educational program "Electronic and Electrical Engineering" ensures that all students achieve the learning outcomes necessary for professional activity. Upon completion of the program, students acquire social and humanitarian knowledge based on the laws of socio-economic development, history, state, Russian and foreign languages, as well as modern information technologies. In addition, they study a cycle of basic disciplines to form professional training in the field of natural, general technical and economic sciences.

Students acquire theoretical knowledge and practical skills necessary for managing and processing information in the field of electronic and electrical

engineering. They acquire the ability to perform technical calculations and justify design solutions using modern computer technologies and intelligent programs. Competencies in planning and organizing theoretical and laboratory research are also formed.

As part of practical training, students become familiar with technical processes of organization, planning and production management. They acquire professional skills in the field of microprocessor complexes for automatic control, digital technologies, various types of sensors, information communication systems and information processing using electronic devices.

Graduates of the educational program will be able to work at enterprises using engineering and technological systems, in research and innovation centers, in high-tech production, and in educational institutions. Their professional activities will be related to remote information processing, data conversion using electronic and radio engineering means, as well as with methods and tools for managing technological processes.

4. Passport of the educational program
4.1. General information

No.	Field name	Note
1	Code and classification of the educational field	6B07 "Engineering, manufacturing and construction industries"
2	Code and classification of training areas	6B071 "Engineering and engineering"
3	Group of educational programs	B063 "Electrical Engineering and Automation"
4	Name of the educational program	6B07104 Electronic and Electrical Engineering
5	Brief description of the educational program description	The 6B07104 Electronic and Electrical Engineering program is aimed at training highly qualified specialists in the field of modern electronic engineering. Students gain in-depth knowledge in such areas as electronics, optoelectronics, microprocessor systems, intelligent control systems, digital technologies and information and communication systems. In addition, they master the development of automated control systems, monitoring and optimization of production processes using modern engineering tools and software. The program emphasizes the combination of theoretical knowledge with practical experience and the development of research activities. Students conduct laboratory and experimental research, undergo practical training at industrial and innovative enterprises. As part of academic mobility, they have the opportunity to study at leading foreign universities and participate in international scientific projects. Graduates of the program can work at enterprises using engineering and technical systems, in research institutes, high-tech production and educational institutions. Their professional activities are related to the development of intelligent systems in the field of electronics and electrical engineering, the

		implementation of automated control systems and the solution of scientific and engineering problems.
6	Purpose of the OP	The goal of the program is to train highly qualified specialists in the field of digital electronics, electrical engineering and automation, possessing deep knowledge, skills and practical abilities that ensure high-quality performance of functional duties in the chosen specialty, mobility in the professional labor market, and knowledge of the latest global achievements and development prospects of the electronic and electrical engineering industry. Students will be able to conduct scientific research in the field of electronics, optoelectronics and nanophotonics, as well as develop intelligent systems in electronic engineering. They will acquire professional competencies in assessing, analyzing and solving production problems, monitoring and managing technological processes. The program provides training of scientific personnel in accordance with international standards, giving graduates the opportunity to work in research and innovation centers, high-tech industries, as well as in the field of scientific and pedagogical activities.
7	Type of EP	new educational program
8	Level according to NQF	6
9	Level according to SQF	6
10	Distinctive features of the EP	has no specific features
11	List of competencies of the educational program:	The duration of study is determined by the volume of academic credits acquired. The educational program is considered fully mastered provided that the expected learning outcomes are achieved and the established volume of academic credits are acquired. The duration of study is 4 years (240 academic credits). Planning of the educational content, methods of organizing and conducting the educational process is carried out by the university and scientific organizations independently on the basis of credit technology of education. The content of the educational program includes: Theoretical training, covering the study of cycles of basic and specialized disciplines; Practical training of students, including various types of practice. Final certification. The content of the educational program "Electronic and Electrical Engineering" is implemented in accordance with the credit technology of education and is carried out in the state, Russian and English languages.
12	Results of the implementation of the educational program:	PO1 – Demonstrate the ability to select measuring instruments and automation equipment, configure, maintain and operate automation elements and devices. PO2 – Demonstrate a set of skills in managing the automation process, select methods, techniques and evaluation criteria to obtain the results of monitoring automated systems. PO3 – Develop structural, functional and other automation schemes. Create technical, software and mathematical support for automated process control systems, as well as IoT systems. PO4 – Apply knowledge of Kazakh, Russian and foreign

		languages to solve problems of interpersonal, intercultural and professional communication. PO5 – Demonstrate the ability to continuously learn, acquire new knowledge, expand and deepen previously acquired skills and competencies, work in a team of developers and users of engineering systems; apply moral, ethical, communication, organizational and managerial skills. PO6 – Demonstrate in practice knowledge of the main types of linear and nonlinear automatic control systems, their mathematical description and modeling. Carry out maintenance, operation and repair of these systems. PO7 – Determine the state of automation objects, technological processes and production, and forecast their development. Apply qualified solutions for the use of automation elements and systems in operation. PO8 – Apply and demonstrate knowledge of the electronic and microprocessor base, microcontroller programming skills, and operate and repair automation equipment. Use programmable logic integrated circuits to build digital automation devices of varying complexity and functionality, and operate and maintain them. PO9 – Apply basic knowledge in the field of ecology and life safety, the fundamentals of anti-corruption culture, entrepreneurship and leadership, and receptivity to innovation in various types of professional and socio-political activities. PO10 – Demonstrate and apply basic mathematical, physical and other natural science knowledge, as well as the theoretical foundations of electrical engineering to solve automation problems. PO11 – Demonstrate skills in developing design and working technical documentation in accordance with norms and standards in the field of electronic engineering. Apply methods for organizing integrated services for testing, configuration, development and design of new services in the field of electronic devices and devices of the electrical industry, as well as their digitalization. PO12 – Apply various types of information and communication technologies and software in professional activities to solve general engineering problems, model electrical and electronic devices in automation, use software and hardware to ensure automation of IoT systems of production processes. Also implement automation of enterprise management.
13	Form of study	Full-time
14	Duration of study	4 year
15	Volume of loans	240 credit
16	Languages of instruction	Kazakh, Russian, English
17	Academic degrees awarded	Bachelor of Engineering and Technology
18	Developer and authors:	E. Tashtay Akylzhan P.B.

4.2 The relationship between the attainability of the learning outcomes formed under the educational program and academic disciplines

			Number of credits	Formed learning outcomes (codes)											
				RO 1	PO 2	PO 3	PO 4	RO 5	RO 6	RO 7	RO 8	RO 9	RO 10	RO 11	RO 12
	Cycle of general education disciplines, Required component														
1	Foreign language	English is a general education subject. After determining the level (according to the results of diagnostic testing or IELTS results), students are divided into groups and subjects. The name of the subject corresponds to the level of English proficiency. When moving from level to level, prerequisites and postrequisites of the subjects are observed.	**10**	V											
2	Kazakh (Russian) language	The course examines socio-political, socio-cultural spheres of communication and functional styles of the modern Kazakh (Russian) language. The course covers the specifics of scientific style in order to develop and activate students' professional and communicative skills and abilities. The course allows students to practically master the basics of scientific style and develops the ability to perform structural and semantic analysis of the text.	**10**	V											
3	Physical culture	The aim of the discipline is the practical use of skills in performing the basic elements of track and field techniques, sports games, gymnastics and a set of standards for general physical training, including professional and applied physical training or one of the sports, methods for conducting independent physical exercise classes.	**8**	V		**V**									
4	Information and communication technologies	The objective of studying the discipline is to acquire theoretical knowledge about information processes, new information technologies, local and global computer	**5**	V											

		networks, methods of information protection; to acquire skills in using text editors and spreadsheet processors; to create databases and various categories of application programs.																
5	History of Kazakhstan	The course studies historical events, phenomena, facts, processes that took place on the territory of Kazakhstan from ancient times to the present day. The sections of the discipline include: introduction to the history of Kazakhstan; steppe empire of the Turks; early feudal states on the territory of Kazakhstan; Kazakhstan during the Mongol conquest (13th century); medieval states in the 14th-15th centuries. The main stages of the formation of Kazakh statehood are also considered: the era of the Kazakh Khanate of the 15th-18th centuries; Kazakhstan as part of the Russian Empire; Kazakhstan during the period of civil confrontation and under a totalitarian system; Kazakhstan during the Great Patriotic War; Kazakhstan during the period of independence and at the present stage.	**5**	V													
6	Philosophy	Philosophy forms and develops critical and creative thinking, worldview and culture, provides knowledge about the most general and fundamental problems of existence and provides them with a methodology for solving various theoretical practical issues. Philosophy expands the horizon of vision of the modern world, forms civic consciousness and patriotism, promotes the development of self-esteem, awareness of the value of human existence. It teaches how to think and act correctly, develops skills of practical and cognitive activity, helps to seek and find ways and means of life in harmony with oneself, society, and the world around us.	**5**	V													
7	Module of socio-political knowledge (sociology,	The discipline is designed to improve the quality of both general humanitarian and professional training of students.	**3**	V													

	political science)	Knowledge in the field of sociology and political science is the key to effective professional activity of a future specialist, as well as for understanding political processes, for the formation of a political culture, development of a personal position and a clearer understanding of the extent of one's responsibility.														
8	Module of socio-political knowledge (cultural studies and psychology)	The socio-political knowledge module (cultural studies, psychology) is designed to familiarize students with the cultural achievements of mankind, to understand and assimilate the basic forms and universal patterns of formation and development of culture, to develop their desire and skills for independent comprehension of the entire wealth of values of world culture for self-improvement and professional growth. During the course of cultural studies, the student will consider general problems of the theory of culture, leading cultural concepts, universal patterns and mechanisms of formation and development of culture, the main historical stages of formation and development of Kazakhstani culture, its most important achievements. During the course, students acquire theoretical knowledge, practical skills and abilities, forming their professional focus from the standpoint of psychological aspects.	5	V												
	Cycle of general education disciplines, Component of choice															
9	Fundamentals of anti-corruption culture and law	Objective: to increase public and individual legal awareness and legal culture of students, as well as to form a system of knowledge and civic position on combating corruption as an antisocial phenomenon. Contents: improving the socio-economic relations of Kazakhstani society, psychological characteristics of corrupt behavior, forming an anti-corruption culture, legal responsibility for corrupt acts in various spheres.	5		V						V					

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№	Name	Description	ECTS												
10	Fundamentals of scientific research methods	Objective: to develop knowledge about scientific research, methods and methodology of scientific research, methods of collecting and processing scientific data in modern science. Contents: fundamentals of the theory of solving inventive problems, with algorithmic methods of searching for technical solutions and their optimization, basic mathematical methods of optimization, application of artificial intelligence capabilities to solve optimization problems, issues of searching, accumulating and processing scientific information.	**5**										V		
11	Basics of financial literacy	Objective: developing students' financial literacy based on establishing a direct link between the knowledge they gain and its practical application. Contents: practical use of all kinds of financial management tools, preserving and increasing savings, competent budget planning, acquiring practical skills in calculating and paying taxes and correctly filling out tax reports, analyzing financial information and navigating financial products to select an adequate investment strategy.	**5**											V	V
12	Ecology and life safety	Objective: formation of ecological knowledge and consciousness, acquisition of theoretical and practical knowledge on modern methods of rational use of natural resources and environmental protection. Contents: study of the tasks of ecology as a science, laws of functioning of natural systems and aspects of environmental safety in working conditions, environmental monitoring and management in the field of its safety, ways of solving environmental problems; life safety in the technosphere, emergency situations of natural and man-made nature.	**5**		V					V					
13	Fundamentals of Economics and Entrepreneurship	The purpose of studying the discipline is to familiarize students with the basic principles of economic theory and entrepreneurial activity. The course includes the study of	**5**											V	V

		basic economic concepts, market mechanisms, management tools and key aspects of entrepreneurship, such as creating and managing a business, analyzing the market environment, financial planning, risk assessment and developing development strategies.														
		Cycle of basic disciplines **University component**														
14	Introduction to Electronic Science and Engineering Technologies	The course provides an idea of the trends in the development of electronic industry technologies, the patterns of their development, determining the relationship between the quality indicators of the element base, performance parameters, and energy consumption indicators of electronic systems. It introduces students to the methods and fundamentals of electronic science and engineering; to the main concepts, models, and principles of building the electronic industry.	4	V			V									
15	Embedded control systems	The objective of the course is to study and develop microprocessor control systems with a complex of sensors and actuators built into the control object. An embedded system is a specialized microprocessor control, monitoring and monitoring system, the development concept of which is that such a system will operate, being built directly into the device it controls. Modern methods of analysis and synthesis of embedded control systems. Algorithms and technologies of embedded control systems. Methods for constructing models for control and monitoring of embedded systems.	5	V						V					V
16	Engineering and computer graphics	Objective: To develop students' knowledge of drawing construction and skills in developing graphic and text design documentation in accordance with the requirements of standards. Contents: Students will study the Unified System for Design Documentation (ESKD) standards, graphic	5	V		V									

		primitives, geometric constructions, methods and properties of orthogonal projection, Monge diagrams, axonometric projections, metric problems, types and features of connections, creating sketches of parts and assembly drawings, detailing, and creating 3D complex solid objects in AutoCAD.													
17	Mathematics	The purpose of mastering the discipline is to form the theoretical and practical foundations of mathematics and its applications. Based on the study of the section of mathematics, to give students the development of thinking and achievements of mathematical culture, which is necessary for application in future professional activities. The course is based on the study of mathematical analysis in a volume that allows you to study elementary functions and solve the simplest geometric, physical and other applied problems. The main attention is paid to differential and integral calculus. The sections of the course include differential calculus of functions of one variable, derivative and differentials, study of the behavior of functions, complex numbers, polynomials. Indefinite integrals, their properties and methods of calculation. Definite integrals and their applications. Improper integrals.	5	V		V									V
18	Mathematics I	Objective: to introduce students to the fundamental concepts of linear algebra, analytical geometry and mathematical analysis. To develop the ability to solve typical and applied problems of the discipline. Contents: Elements of linear algebra, vector algebra and analytical geometry. Introduction to analysis. Differential calculus of a function of one variable. Study of functions using derivatives. Functions of several variables. Partial derivatives. Extremum of a function of two variables.	5	V		V									V
19	Mathematics II	Objective: To teach students integration methods. To teach	5	V		V									V

№	Name	Description	Credit														
		how to choose the right method for finding the antiderivative. To teach how to apply the definite integral to solving practical problems. Contents: integral calculus of functions of one and two variables, theory of series. Indefinite integrals, methods of their calculation. Definite integrals and applications of definite integrals. Improper integrals. Theory of numerical and functional series, Taylor and Maclaurin series, application of series to approximate calculations.															
20	Basics of automation	The discipline studies the main measuring devices, primary converters (sensors) of process parameters, actuators, microcontrollers and automatic control systems of machine tools and process equipment. Describes the elements of automation systems, time and frequency characteristics of typical links, criteria for studying linear systems for stability and methods for assessing the quality of the process.	5	V				V	V		V						
21	Fundamentals of Optoelectronics	Study of the interaction of optical radiation with electrons in matter, mainly in solids, for the creation of optoelectronic devices that convert electrical signals into optical signals (semiconductor lasers, light-emitting diodes) and optical signals into electrical signals (photodetectors of various types). The physical effects, operating principles and design features of the main types of optoelectronic devices are presented. The physical and technical characteristics of such devices are given, and issues of their application in information processing systems are considered.	5	V		V											
22	Fundamentals of Electronics and Instrumentation	Study of the modern level of electronic engineering, principles of construction and operation of semiconductor devices, areas of their application. Study of measuring technologies that combine a set of methods, approaches, software and logical support for the organization of measurements; trends in the development of measuring	5	V	V												

		instruments and basic methods for measuring the characteristics of electronic and electrical circuits and signals, assessment of their accuracy.												
23	Power electronics in automation	Elemental components of power electronic devices. Control system of power electronic devices. Converters with network switching. Autonomous inverters. Pulse modulation in power electronic devices. DC converters. Thyristor-capacitor regulators.	4	V			V							
24	Theoretical foundations of electrical engineering I	The course covers: basic concepts and definitions used in electrical engineering; modern methods of modeling electromagnetic processes; methods of analyzing electrical and magnetic circuits; numerical methods of analyzing electrical circuits; basic laws and principles of electrical engineering, properties and characteristics of electrical circuits; methods of analyzing electrical circuits in steady-state and transient modes; choosing the optimal calculation method, determining the main parameters and characteristics of electrical circuits.	6	V	V			V					
25	Theoretical Foundations of Electrical Engineering II	The course provides an understanding of the basic equations and circuit diagrams; electrical filters and four-terminal networks; transient processes in linear electrical circuits, RL and RC circuits of the first degree; calculation of transient processes in circuits of the second degree. It introduces students to the characteristics of single-type networks, types of long networks, the operator method, nonlinear circuits of sinusoidal currents and methods of their analysis.	5	V	V			V					
26	TRIZ in solving engineering problems	The content of the discipline "TRIZ in solving engineering problems" includes the main issues on the development of technical systems, methods for solving inventive problems, methods for determining the main functions of technical systems, Su-Field analysis, critical analysis of supersystems and subsystems, methods for applying the information fund	6	V	V					V	V		

		and TRIZ standards to solve engineering problems.									
27	Physics I	Objective: study of the basic physical phenomena and laws of classical and modern physics; methods of physical research; influence of physics on the development of technology; connection of physics with other sciences and its role in solving scientific and technical problems of the specialty. Contents: mechanics, dynamics of rotational motion of a solid, mechanical harmonic waves, fundamentals of molecular-kinetic theory and thermodynamics, transport phenomena, continuum mechanics, electrostatics, direct current, magnetic field, Maxwell's equations.	5	V					V	V	
28	Physics II	Objective: to develop students' knowledge and skills in using fundamental laws, theories of classical and modern physics, as well as methods of physical research as the basis of a professional activity system. Contents: harmonic oscillations, damped oscillations, alternating current, wave motion, laws of refraction and reflection of light, quantum optics.laws of thermal radiation, photons, their characteristics, wave function, electrical conductivity of metals, atomic nucleus, its structure and properties, binding energy, radioactivity.	5	V					V	V	
29	Physical principles of electronics	The physical processes that determine the principles of construction and operation of semiconductor devices are considered. Electronic circuits of semiconductor devices (diodes, thyristors, dinistors, triacs, transistors) and microcircuits are also considered, the specific area of application of these devices, the main volt-ampere characteristics of electronic devices and the parameters of electronic circuits are indicated.	5	V	V	V					V
30	Electronics and circuitry	The basic principles of constructing electronic circuits, the principles of operation of amplifying and converting	5	V	V	V	V				

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		cascades, signal generators, electrical filters, the principles of operation of integrated circuits, and various aspects of using the element base of electronics in practical activities are considered. For this purpose, the principles of operation of various transistor amplifiers are considered in detail, as well as integrated versions of amplifiers such as differential cascades and operational amplifiers, and their schematic design.																
31	Electrical devices	The course examines the most common and basic types of electrical devices that are widely used in various areas of human life: circuit breakers, magnetic starters, various relays, electric motors, sensors, meters and measuring devices, converters, etc. Physical principles of operation and characteristics of electrical and magnetic circuits, systems and devices. Methodology for calculating electrical devices and their main parameters.	5	V	V	V												V
		Cycle of basic disciplines **Component of choice**																
32	Inclusive technologies and universal design in engineering systems	This course explores the principles of inclusive technology and universal design in engineering systems. Students will learn how to create accessible environments, adaptive technologies, and ergonomic solutions that provide equal opportunities for all users, including people with disabilities. The course covers the integration of assistive technologies, smart systems, and sustainable design approaches to improve accessibility in a variety of engineering applications.	5	V		V												V
33	Computing methods and programming	The course "Methods of calculation and programming" is a section of science that arose at the junction of computational mathematics, mechanics and mechanical engineering. The subject of this section of science is the numerical modeling of various movements and flows, as well as programming	5	V		V					V		V				

№	Name	Description													
		the resulting problems on a computer													
34	Modeling of electronic circuits in MatLab and other software products	The course teaches students the basics of working in the MatLab virtual software environment. Introduction to a set of virtual programs and their applications, libraries and library components; Mastering the skills of creating a MatLab model, processing schemes and properties of model components.	5	V		V									
35	Fundamentals of Artificial Intelligence	Objective: to introduce students to the basic concepts, methods and technologies in the field of artificial intelligence: machine learning, computer vision, natural language processing, etc. Contents: general definition of artificial intelligence, intelligent agents, information retrieval and state space exploration, logical agents, architecture of artificial intelligence systems, expert systems, observational learning, statistical learning methods, probabilistic processing of linguistic information, semantic models, natural language processing systems.	5	V							V				
36	Fundamentals of Sustainable Development and ESG Projects in Kazakhstan	Objective: to provide students with theoretical foundations and practical skills in the field of sustainable development and ESG, as well as to develop an understanding of the role of these aspects in the modern economic and social development of Kazakhstan. Content: introduces the principles of sustainable development and the implementation of ESG practices in Kazakhstan, includes the study of national and international standards, analysis of successful ESG projects and strategies for their implementation at enterprises and organizations.	5												V	V
37	Legal regulation of intellectual property	Objective: to develop a comprehensive understanding of the system of legal regulation of intellectual property, including the basic principles, mechanisms for protecting intellectual property rights and the specifics of their implementation. Content: the course covers the basics of IP legislation,	5	V		V									V	V

		including copyright, patents, trademarks, and industrial designs. Students learn how to protect and manage intellectual property rights, and also examine legal disputes and methods for resolving them.														
38	Embedded Systems Programming	The content of the discipline covers a range of issues related to the development of software and hardware complexes for embedded systems, methods of their programming, development and debugging of control algorithms in the tasks of automation of scientific research and technological processes. Studying the discipline contributes to the goal of training elite highly motivated personnel for scientific research and professional activities in innovative and knowledge-intensive sectors of the economy.	5	V		V		V			V				
39	Programming for microcontrollers	The course is aimed at studying the methods of programming microcontrollers and acquiring skills in the practical application of microcontrollers in modern information-measuring and control systems; developing skills in programming microcontrollers to solve various problems, using analog-to-digital and digital-to-analog converters.	5	V		V		V			V				
40	Programming in a high-level language	The course is aimed at familiarizing with the basics of algorithmization and programming, as well as their main provisions; studying the rules for constructing algorithms; studying the high-level programming language C++/Python, studying the principles of a modular approach to programming; studying methods for constructing and verifying programs	5	V		V			V						
41	Modeling software	The course teaches students the basics of working in virtual software environments MathLab, Electronics Workbench, etc. Getting to know a set of virtual programs and their applications, libraries and library components. Mastering the skills of creating a model, processing schemes and properties	5	V		V					V				

		of model components																
42	Digital control of electric drives	General concepts of digital control systems for electric drives. Digital control systems for electric drive speed and position. Calculation models of digital control systems taking into account discreteness by level. Discrete transfer functions. Structural diagrams of an electric drive control loop. Digital loop synthesis technique. Optimization of a digital current loop for an electric drive with a thyristor converter. Optimization of a digital speed loop. Optimization of a digital position loop. Digital units in electric drive systems.	**4**	V						V				V	
43	Frequency control of electric drives	Control object - asynchronous motor. Frequency control - general concepts and terms. Modular control. Vector control. Selection of the equation of electromagnetic torque and coordinate system. Models controlled by stator current. Models controlled by stator voltage. Features of speed controller adjustment. Direct torque control. Pulse-width converters. Modern converters for electric drives of wide application.	**4**	V				V	V						
		Cycle of major disciplines **University component**																
44	Basics of Electric Drives	Functions of electric drive elements. Basics of electric drive mechanics. DC electric drives. AC electric drives. Transient processes. Energy efficiency assessment. Losses in steady-state conditions. Losses in transient conditions. Energy saving by means of electric drive.	**4**	V					V						V
45	Programmable logic integrated circuits	Classification and main properties of programmable logic microcircuits. Recommendations for choosing the family and type of FPGA for the device being developed. Creating a schematic description of the designed device. Entering time and topological constraints of the project. Functional modeling of the designed device based on FPGA. Structure	**5**	V		V		V							

#	Discipline	Description	Cr.														
		and methods of preparing the test module of the project. Creating a test module of the project in text format and in the form of timing diagrams. Stages of modeling digital devices based on FPGA.																
46	Voltage and energy	Objective: to develop a deep understanding of processes in energy systems and prepare for the design and management of modern energy facilities. The content includes theoretical classes, practical laboratory work and the study of current examples from the energy sector. Content: a comprehensive study of the theoretical and practical aspects of electrical systems and energy. Includes the study of the fundamentals of electrical engineering, distribution and transmission of electricity, as well as analysis of the operation of energy systems.	6	V					V							V	V
47	Internet of Things Technology	This course provides an in-depth look at self-organizing networks, the concept of the Internet of Things, pervasive sensor networks, wireless and vehicular self-organizing networks, 5G aspects of IoT, and an overview of the main protocols for media access control, routing, and transport layer. It examines the legal, regulatory, and rights issues of IoT as a fundamental element of the developing economy.	5		V											V	V
48	Electrical measuring instruments for automation	Purpose of automation devices. Operating principles of automatic measuring devices. Classification. Connection diagrams. Ensuring control and management of automatic devices. Regulatory requirements. Automation of processes of switching on and off measuring devices and monitoring of parameters in online mode. Operation and maintenance of measuring devices under warranty service.	5	V					V	V							
	Cycle of major disciplines **Component of choice**																	
49	Dynamics and control of electric drives	The objective of the course includes studying the principles of operation, dynamic characteristics, control methods and	4		V		V									V	V

№	Course name	Description	Cr														
		application of various types of electric drives. It is aimed at preparing students to understand and develop electric drive systems for various industrial applications. The main topics that this course usually covers are: Fundamentals of Electric Drives, Principles of Electric Drive Control, Energy Efficiency, etc. The course includes not only theoretical classes, but also practical laboratory work, which allows students to apply the acquired knowledge and skills in practice, develop and analyze electric drive control systems, which is important for their future professional activities.															
50	Measuring and control devices in communication systems	The course is aimed at studying the principles of operation of measuring and control devices used in telecommunication systems. Students will study radio frequency spectrum analyzers, fiber optic testing devices, devices for measuring antenna parameters and network monitoring systems. In addition, they will master the methods of testing and diagnostics of communication systems.	**4**				V	V									
51	Linear automatic control systems	The aim of the course is to teach students the basics of the theory of linear automatic control systems, methods of mathematical description of systems, methods of studying stability and quality. The content covers the following topics: Basic principles and schemes of automatic control systems. Typical links of automatic control systems. Time and frequency characteristics of links and systems. Rules for transforming structural schemes. Algebraic and frequency methods for analyzing the stability of linear automatic control systems. Direct and indirect methods for assessing the quality of linear automatic control systems.	**5**	V				V		V							
52	Microprocessor systems	The objective of the course is to explain to students the structure and operating principles of microprocessor systems, as well as to develop skills in their design and programming. A course on microprocessor systems typically	**5**				V				V			V			

		includes a study of the structure of microprocessors, their operating principles, and areas of application. The content of this course may include the following sections: 1. History of Microprocessor Development: This section discusses the emergence of microprocessors, their development, and changes. 2. Architecture of Microprocessor Systems: Explains the structure and functions of major components such as system buses, processor memory, input/output, and control units. 3. Assembly Language: The role of assembly language in working with microprocessors, its syntax, and programming techniques. 4. Programming Microprocessor Systems: Application of programming languages, as well as the processes of translation from high-level languages to assembly language. 5. Interacting with I/O Devices: Methods of interacting with I/O ports, timers, and other peripheral devices.														
53	Design and control of electrical devices	The objective of the course "Design and Control of Electrical Devices" covers theoretical and practical aspects of development, control and operation of various electrical systems and devices. Content that can be included in the course program: 1. Fundamentals of Electrical Engineering: Introduction to electrical circuits, Ohm's and Kirchhoff's laws, circuit analysis methods. 2. Electronic Components and Circuits: Study of various electronic components (resistors, capacitors, transistors, microcircuits) and their application in circuits. 3. Design of Electrical Machines and Transformers: Development and analysis of asynchronous, synchronous machines, transformers and other electromechanical devices. 4. Automatic Control Systems: Fundamentals of control theory, design of automation systems, use of controllers and microprocessor systems in control of electrical devices.	4		V	V									V	V

№	Discipline	Content	Cr.													
54	Design of security systems	The content of the discipline "Design of security systems" includes the main issues on designing complex security systems. General principles of organizing the protection of objects, structural and functional features of technical means of ensuring security, as well as methods of combining various security subsystems into an integrated complex taking into account the specifics of a particular object are considered.	**6**		V		V			V		V				
55	Design of electronic means	Study of design methods for technological processes of electronic equipment production. Structure and classes of electronic equipment, factors determining the construction of electronic equipment. Main stages of development. Modern and advanced designs of electronic equipment – cells, modules, blocks, cabinets. Basics of standardization. Unification of designs. General provisions on quality, on the technical level and on management systems and quality assurance of products.	**5**	V	V		V		V						V	
56	Design of electrical devices	Study of the system analysis method in designing electrical devices. Definition of the main features of electrical devices and the basis for searching for technical solutions. Heuristic search methods. Morphological and automated methods for synthesizing technical solutions. Methods and principles for solving inventive problems. Evaluation and consideration of electromagnetic compatibility of electrical devices during design. Methods for solving engineering and economic problems using application software	**5**	V	V	V	V	V							V	
57	Automation systems	The objective of the course is to help students develop technical knowledge and skills required to solve specific engineering problems. The course covers automation systems, their structure, operating principles, and hardware. This course is designed for students in the fields of engineering, robotics, or software. The course content	**6**		V									V	V	

		includes the following topics: 1. Basic concepts of automation systems: definition of automation, its types, purposes, and areas of application. 2. Sensors and measuring devices: different types of sensors and their operating principles, measurement methods, and accuracy. 3. Control systems: PID controllers, logic controllers, automated control system circuits and algorithms. 4. Programmable logic controllers (PLC): operating principles of PLCs, programming languages, and their applications. 5. Integration of automation systems: network technologies, communication protocols, and systems integration methods.																	
57	Security alarm systems	The content of the discipline includes theoretical information about the structure, composition and main tasks of fire alarm systems, issues of categorization of protected objects, classification of fire alarm equipment, principles of operation of fire alarm electronic components and telecommunication systems, as well as regulatory requirements for ensuring security are considered.	6						V				V	V					
58	Technical means of automation and control	Systems approach to designing technical means (TM). Structures of automatic control systems (ACS). Typical composition of TM ACS. State system of devices. Devices for obtaining information about an object. Classification of sensors. Data transmission systems. TM ACS interfaces. Industrial computers. Programmable controllers. Actuators for implementing control actions. Equipment protection	6						V			V						
59	Digital circuitry	Digital circuit engineering is aimed at studying discrete electronic circuits, where electrical impulses have a specific pair of stable parameters of voltage and electric current. Circuit engineering is a direction in the field of electronics, which is focused on the study and development of principles of operation and technologies for preparing circuit designs that form the basis of electronic equipment.	5		V							V	V					

60	Electronic sensors and transducers	Objective: to familiarize students with electronic sensors and converters used in electric power systems at all stages - from production to consumption of electric power. Contents: study of the purpose, main characteristics and areas of application of electronic sensors and converters in electric power systems. Consideration of the principles of their operation, design features and methods of use at various stages of production, transmission, distribution and consumption of electric power.	4	V				V				V	
61	Electronic engineering	Organization of complex services for testing, for setting up, for development and design of new services in the field of electronic devices and instruments, as well as issues of support and warranty services. Practical application of modern electronic components, means and technologies for information and telecommunication systems, transport and space technology, energy, computing and medical equipment. Modern and promising electronic means, approaches and methods in research, modeling and design of micro- and nanoelectronics products	5	V	V			V				V	

"Қ. И. СӘТБАЕВ АТЫНДАҒЫ ҚАЗАҚ ҰЛТТЫҚ ТЕХНИКАЛЫҚ ЗЕРТТЕУ УНИВЕРСИТЕТІ"
КОММЕРЦИЯЛЫҚ ЕМЕС АКЦИОНЕРЛІК ҚОҒАМЫ

SATBAYEV UNIVERSITY

ОҚУ ЖҰМЫС ЖОСПАРЫ

Оқу жылы	**2025-2026 (Күз, Көктем)**
Білім беру бағдарламаларының тобы	**В063 - "Электр техникасы және автоматтандыру"**
Білім беру бағдарламасы	**6В07104 - "Electronic and Electrical Engineering"**
Берілетін академиялық дәреже	**Техника және технология бакалавры**
Оқу мерзімі және формасы	**күндізгі - 4 жыл**

Пәннің коды	Пәннің атауы	Блок	Цикл	Академиялық кредиттің жалпы көлемі	Барлық сағаттар	дәріс/лаб/пр/ Аудиториялық сағаттар	сағатпен СӨЖ (оның ішінде СОӨЖ)	Бақылау түрі	1 сем	2 сем	3 сем	4 сем	5 сем	6 сем	7 сем	8 сем	Пререквизиттілік
									1 курс		2 курс		3 курс		4 курс		
ЖАЛПЫ БІЛІМ БЕРЕТІН ПӘНДЕР ЦИКЛІ (ЖБП)																	
М-5. Сыбайлас жемқорлыққа қарсы мәдениет, экология және тіршілік қауіпсіздігі негіздері модулі																	
CHE656	Экология және тіршілік қауіпсіздігі	1	ЖББП, ТК	5	150	30/0/15	105	E				5					
HUM136	Сыбайлас жемқорлыққа қарсы мәдениет пен құқық негіздері	1	ЖББП, ТК	5	150	30/0/15	105	E				5					
MNG489	Экономика және кәсіпкерлік негіздері	1	ЖББП, ТК	5	150	30/0/15	105	E				5					
ELC577	Ғылыми зерттеу әдістерінің негіздері	1	ЖББП, ТК	5	150	30/0/15	105	E				5					
MNG564	Қаржылық сауаттылық негіздері	1	ЖББП, ТК	5	150	30/0/15	105	E				5					
М-1.Тілдік дайындық модулі																	
LNG108	Шетел тілі		ЖББП, МК	5	150	0/0/45	105	E	5								
LNG104	Қазақ (орыс) тілі		ЖББП, МК	5	150	0/0/45	105	E	5								
LNG108	Шетел тілі		ЖББП, МК	5	150	0/0/45	105	E		5							
LNG104	Қазақ (орыс) тілі		ЖББП, МК	5	150	0/0/45	105	E		5							
М-2.Дене шынықтыру модулі																	
KFK101	Дене шынықтыру I		ЖББП, МК	2	60	0/0/30	30	E	2								
KFK102	Дене шынықтыру II		ЖББП, МК	2	60	0/0/30	30	E		2							
KFK103	Дене шынықтыру III		ЖББП, МК	2	60	0/0/30	30	E			2						
KFK104	Дене шынықтыру IV		ЖББП, МК	2	60	0/0/30	30	E				2					
М-3.Ақпараттық технологиялар модулі																	
CSE677	Ақпараттық-коммуникациялық технологиялар		ЖББП, МК	5	150	30/15/0	105	E			5						
М-4.Әлеуметтік-мәдени даму модулі																	
HUM137	Қазақстан тарихы		ЖББП, МК	5	150	15/0/30	105	ME	5								
HUM132	Философия		ЖББП, МК	5	150	15/0/30	105	E			5						
HUM120	Әлеуметтік-саясаттану білім модулі (әлеуметтану, саясаттану)		ЖББП, МК	3	90	15/0/15	60	E			3						
HUM134	Әлеуметтік-саясаттану білім модулі (мәдениеттану, психология)		ЖББП, МК	5	150	30/0/15	105	E				5					
БАЗАЛЫҚ ПӘНДЕР ЦИКЛІ (БП)																	
М-6.Физика-математикалық дайындық модулі																	
MAT101	Математика I		БП, ЖООК	5	150	15/0/30	105	E	5								

Код	Пән	№	Цикл	Кредит	Сағат	Дәр/Тәж/Зерт	СОӨЖ	Бақылау	1	2	3	4	5	6	7	8	Пререквизит
PHY111	Физика I		БП, ЖООК	5	150	15/15/15	105	E	5								
PHY112	Физика II		БП, ЖООК	5	150	15/15/15	105	E		5							PHY111
MAT102	Математика II		БП, ЖООК	5	150	15/0/30	105	E		5							MAT101
MAT423	Математика		БП, ЖООК	5	150	15/0/30	105	E			5						
М-7.Базалық дайындық модулі																	
GEN429	Инженерлік және компьютерлік графикасы		БП, ЖООК	5	150	15/0/30	105	E	5								
ELC589	Электротехниканың теориялық негіздері I		БП, ЖООК	6	180	15/15/15	135	E				6					
ELC587	Модельдеуге арналған программалық орта	1	БП, ТК	5	150	15/15/15	105	E				5					
ELC588	MatLab және басқа да бағдарламалық өнімдерінде электрондық сұлбаларды модельдеу	1	БП, ТК	5	150	15/15/15	105	E				5					
MNG563	Қазақстандағы тұрақты даму негіздері және ESG жобалары	1	БП, ТК	5	150	30/0/15	105	E				5					
ELC590	Электротехниканың теориялық негіздері II		БП, ЖООК	5	150	15/15/15	105	E					5				
ELC544	Электрониканың физикалық негіздері		БП, ЖООК	5	150	15/15/15	105	E					5				
ROB504	Жоғары деңгейлі бағдарламалау	1	БП, ТК	5	150	30/15/0	105	E						5			
ROB505	Есептеу және бағдарламалау әдістері	1	БП, ТК	5	150	15/15/15	105	E						5			
CSE831	Жасанды интеллект негіздері	1	БП, ТК	5	150	15/0/30	105	E						5			
ELC802	Инженерлік жүйелердегі инклюзивті технологиялар және әмбебап дизайн	1	БП, ТК	5	150	30/0/15	105	E						5			
М-8.Электроника және жасанды интеллект модулі																	
ELC479	Электрондық ғылым технологиясына және инженерияға кіріспе		БП, ЖООК	4	120	30/0/15	75	E				4					
ELC573	Электроника және өлшеу техникасы негіздері		БП, ЖООК	5	150	15/15/15	105	E					5				
ELC591	Электроника және схемотехника		БП, ЖООК	5	150	15/15/15	105	E						5			
ELC100	Оптоэлектрониканың негіздері		БП, ЖООК	5	150	15/0/30	105	E						5			
ELC574	Электротехникалық құрылғылар		БП, ЖООК	5	150	30/0/15	105	E							5		
ROB411	Ендірілетін жүйелерді бағдарламалау	1	БП, ТК	5	150	15/15/15	105	E							5		
ROB195	Микроконтроллерлер үшін бағдарламалау	1	БП, ТК	5	150	30/15/0	105	E							5		
MNG562	Зияткерлік меншікті құқықтық реттеу	1	БП, ТК	5	150	30/0/15	105	E							5		
М-9.Электр жетектері мен өлшеу құралдарының модулі																	
ELC578	Сандық электр жетегін басқару	1	БП, ТК	4	120	30/0/15	75	E							4		
ELC579	Электр жетегінің жиілігін басқару	1	БП, ТК	4	120	30/0/15	75	E							4		
М-10.Өндірісті автоматтандыру модулі																	
AUT424	Автоматтандыру негіздері		БП, ЖООК	5	150	30/15/0	105	E						5			
ELC581	Автоматикадағы электроника		БП, ЖООК	4	120	30/0/15	75	E						4			
ELC633	Ендірілген басқару жүйелері		БП, ЖООК	5	150	30/15/0	105	E							5		
М-11.Шығармашылықты дамыту модулі																	
ELC492	ТРИЗ инженерлік есептерді шешуде		БП, ЖООК	6	180	30/0/30	120	E							6		
М-13.Кәсіби қызмет модулі																	
AAP173	Оқу тәжірибесі		БП, ЖООК	2				E				2					
ПРОФИЛЬДІК ПӘНДЕР ЦИКЛІ (ПП)																	
М-8.Электроника және жасанды интеллект модулі																	
ELC685	Интернет заттарының технологиясы		ПП, ЖООК	5	150	30/0/15	105	E						5			
ELC677	Электрондық сенсорлар мен түрлендіргіштер	2	ПП, ТК	4	120	30/0/15	75	E							4		
ELC807	Байланыс жүйелеріндегі өлшеу және бақылау құрылғылары	2	ПП, ТК	4	120	15/15/15	75	E							4		
ELC585	Сандық схема	1	ПП, ТК	5	150	30/15/0	105	E								5	
ELC565	Электрондық инжиниринг	1	ПП, ТК	5	150	30/0/15	105	E								5	

Код	Пән атауы		Цикл	Кредит	Сағат		СӨЖ	Бақылау	1	2	3	4	5	6	7	8
ELC596	Күзет дабылы жүйелері	1	ПП, ТК	6	180	30/0/15	135	Е								6
ELC597	Қауіпсіздік жүйелерін жобалау	1	ПП, ТК	6	180	30/0/15	135	Е								6
M-9.Электр жетектері мен өлшеу құралдарының модулі																
ELC580	Электр жетегінің негіздері		ПП, ЖООК	4	120	15/15/15	75	Е						4		
ELC634	Микропроцессорлық жүйелер	2	ПП, ТК	5	150	30/15/0	105	Е							5	
AUT411	Сызықты автоматты реттеу жүйелері	2	ПП, ТК	5	150	15/15/15	105	Е							5	
ELC524	Бағдарламаланатын логикалық интегралды схемалар		ПП, ЖООК	5	150	30/0/15	105	Е								5
ELC631	Электр жетегінің динамикасы мен басқаруы	1	ПП, ТК	4	120	30/15/0	75	Е								4
ELC632	Электротехникалық құрылғыларды жобалау және басқару	1	ПП, ТК	4	120	30/15/0	75	Е								4
M-10.Өндірісті автоматтандыру модулі																
ELC584	Автоматтандырудың электрлік өлшеуіш құралдары		ПП, ЖООК	5	150	30/0/15	105	Е						5		
ELC642	Кернеу және энергия		ПП, ЖООК	6	180	30/0/30	120	К							6	
ELC582	Автоматтандыру және басқарудың техникалық құралдары	1	ПП, ТК	6	180	30/0/15	135	Е								6
ELC635	Автоматтандыру жүйелері	1	ПП, ТК	6	180	30/0/30	120	Е								6
M-13.Кәсіби қызмет модулі																
AAP102	Өндірістік практика I		ПП, ЖООК	2				Е				2				
AAP183	Өндірістік тәжірибе II		ПП, ЖООК	3				Е						3		
M-14.Қорытынды аттестаттау модулі																
ECA103	Қорытынды аттестация		ҚА	8												8
M-12. "R&D" модулі																
ELC594	Электротехникалық құрылғыларды жобалау	1	ПП, ТК	5	150	15/15/15	105	Е							5	
ELC595	Электрондық құралдарды жобалау	1	ПП, ТК	5	150	15/15/15	105	Е							5	
Оқытудың қосымша түрлері (ОҚТ)																
AAP500	Әскери дайындық															
УНИВЕРСИТЕТ бойынша жиыны:									32	28	31	29	29	31	31	29
									60		**60**		**60**		**60**	

Барлық оқу кезеңіндегі кредиттер саны

Цикл коды	Пәндер циклдері	Кредиттер			
		міндетті компонент (МК)	ЖОО компоненті (ЖООК)	таңдау компонент (ТК)	Барлығы
ЖББП	Жалпы білім беретін пәндер циклі	51	0	5	56
БП	Базалық пәндер циклі	0	92	19	111
ПП	Профильдік пәндер циклі	0	30	35	65
Теориялық оқыту бойынша барлығы:		**51**	**122**	**59**	**232**
ҚА	Қорытынды аттестаттау				8
ЖИЫНЫ:					**240**

Қол қойылды:

Басқарма мүшесі - Академиялық мәселелер жөніндегі проректор — Ускенбаева Р. К.

Келісілді:

Академиялық даму жөніндегі Vice- Provost — Кальпеева Ж. Б.

Бөлім басшысы - БББ басқару және оқу-әдістемелік жұмыс бөлімі — Жумагалиева А. С.

Институт директорының м.а. - Автоматика және ақпараттық технологиялар институты — Чинибаев Е. Г.

Кафедра меңгерушісі - Электроника, телекоммуникация және ғарыштық технологиялар — Таштай Е. Т.

Жұмыс берушілер атынан академиялық комитеттің өкілі ____Таныстым____ — Джаникеев М. С.

РАБОЧИЙ УЧЕБНЫЙ ПЛАН

Учебный год	**2025-2026 (Осень, Весна)**
Группа образовательных программ	**B063 - "Электротехника и автоматизация"**
Образовательная программа	**6B07104 - "Electronic and Electrical Engineering"**
Присуждаемая академическая степень	**Бакалавр техники и технологий**
Форма и срок обучения	**очная - 4 года**

Код дисциплины	Наименование дисциплин	Блок	Цикл	Общий объем в академических кредитах	Всего часов	лек/лаб/пр Аудиторные часы	в часах СРО (в том числе СРОП)	Форма контроля	Распределение аудиторных занятий по курсам и семестрам								Пререквизитность
									1 курс		2 курс		3 курс		4 курс		
									1 сем	2 сем	3 сем	4 сем	5 сем	6 сем	7 сем	8 сем	
ЦИКЛ ОБЩЕОБРАЗОВАТЕЛЬНЫХ ДИСЦИПЛИН (ООД)
ЦИКЛ ОБЩЕОБРАЗОВАТЕЛЬНЫХ ДИСЦИПЛИН (ООД)																	
М-5. Модуль основы антикоррупционной культуры, экологии и безопасности жизнедеятельности																	
CHE656	Экология и безопасность жизнедеятельности	1	ООД, КВ	5	150	30/0/15	105	Э			5						
HUM136	Основы антикоррупционной культуры и права	1	ООД, КВ	5	150	30/0/15	105	Э			5						
MNG489	Основы экономики и предпринимательства	1	ООД, КВ	5	150	30/0/15	105	Э			5						
ELC577	Основы методов научных исследований	1	ООД, КВ	5	150	30/0/15	105	Э			5						
MNG564	Основы финансовой грамотности	1	ООД, КВ	5	150	30/0/15	105	Э			5						
М-1.Модуль языковой подготовки																	
LNG108	Иностранный язык		ООД, ОК	5	150	0/0/45	105	Э	5								
LNG104	Казахский (русский) язык		ООД, ОК	5	150	0/0/45	105	Э	5								
LNG108	Иностранный язык		ООД, ОК	5	150	0/0/45	105	Э		5							
LNG104	Казахский (русский) язык		ООД, ОК	5	150	0/0/45	105	Э		5							
М-2.Модуль физической подготовки																	
KFK101	Физическая культура I		ООД, ОК	2	60	0/0/30	30	Э	2								
KFK102	Физическая культура II		ООД, ОК	2	60	0/0/30	30	Э		2							
KFK103	Физическая культура III		ООД, ОК	2	60	0/0/30	30	Э			2						
KFK104	Физическая культура IV		ООД, ОК	2	60	0/0/30	30	Э				2					
М-3.Модуль информационных технологий																	
CSE677	Информационно-коммуникационные технологии		ООД, ОК	5	150	30/15/0	105	Э				5					
М-4.Модуль социально-культурного развития																	
HUM137	История Казахстана		ООД, ОК	5	150	15/0/30	105	ГЭ	5								
HUM132	Философия		ООД, ОК	5	150	15/0/30	105	Э			5						
HUM120	Модуль социально-политических знаний (социология, политология)		ООД, ОК	3	90	15/0/15	60	Э			3						
HUM134	Модуль социально-политических знаний (культурология, психология)		ООД, ОК	5	150	30/0/15	105	Э				5					
ЦИКЛ БАЗОВЫХ ДИСЦИПЛИН (БД)																	
М-6.Модуль физико-математической подготовки																	
MAT101	Математика I		БД, ВК	5	150	15/0/30	105	Э	5								

Код	Дисциплина		Цикл	Кред.	Часы	Л/П/Лаб	СРО	Форма	1	2	3	4	5	6	7	8	Пререквизиты
PHY111	Физика I		БД, ВК	5	150	15/15/15	105	Э	5								
PHY112	Физика II		БД, ВК	5	150	15/15/15	105	Э		5							PHY111
MAT102	Математика II		БД, ВК	5	150	15/0/30	105	Э		5							MAT101
MAT423	Математика		БД, ВК	5	150	15/0/30	105	Э			5						
М-7.Модуль базовой подготовки																	
GEN429	Инженерная и компьютерная графика		БД, ВК	5	150	15/0/30	105	Э	5								
ELC589	Теоретические основы электротехники I		БД, ВК	6	180	15/15/15	135	О		6							
ELC587	Программные средства моделирования	1	БД, КВ	5	150	15/15/15	105	О		5							
ELC588	Моделирование электронных схем в среде MatLab и других программных продуктах	1	БД, КВ	5	150	15/15/15	105	О		5							
MNG563	Основы устойчивого развития и ESG проекты в Казахстане	1	БД, КВ	5	150	30/0/15	105	Э		5							
ELC590	Теоретические основы электротехники II		БД, ВК	5	150	15/15/15	105	О			5						
ELC544	Физические основы электроники		БД, ВК	5	150	15/15/15	105	Э			5						
ROB504	Программирование на языке высокого уровня	1	БД, КВ	5	150	30/15/0	105	Э				5					
ROB505	Методы вычисления и программирование	1	БД, КВ	5	150	15/15/15	105	Э				5					
CSE831	Основы искусственного интеллекта	1	БД, КВ	5	150	15/0/30	105	Э				5					
ELC802	Инклюзивные технологии и универсальный дизайн в инженерных системах	1	БД, КВ	5	150	30/0/15	105	Э				5					
М-8.Модуль электроники и искусственного интеллекта																	
ELC479	Введение в технологии электронной науки и инженерии		БД, ВК	4	120	30/0/15	75	Э			4						
ELC573	Основы электроники и измерительной техники		БД, ВК	5	150	15/15/15	105	Э				5					
ELC591	Электроника и схемотехника		БД, ВК	5	150	15/15/15	105	О				5					
ELC100	Основы оптоэлектроники		БД, ВК	5	150	15/0/30	105	Э				5					
ELC574	Электротехнические устройства		БД, ВК	5	150	30/0/15	105	Э					5				
ROB411	Программирование встраиваемых систем	1	БД, КВ	5	150	15/15/15	105	Э					5				
ROB195	Программирование для микроконтроллеров	1	БД, КВ	5	150	30/15/0	105	Э					5				
MNG562	Правовое регулирование интеллектуальной собственности	1	БД, КВ	5	150	30/0/15	105	Э					5				
М-9.Модуль электроприводов и измерительных приборов																	
ELC578	Цифровое управление электроприводов	1	БД, КВ	4	120	30/0/15	75	Э							4		
ELC579	Частотное управление электроприводов	1	БД, КВ	4	120	30/0/15	75	Э							4		
М-10.Модуль автоматизации производства																	
AUT424	Основы автоматизации		БД, ВК	5	150	30/15/0	105	Э				5					
ELC581	Силовая электроника в автоматике		БД, ВК	4	120	30/0/15	75	Э				4					
ELC633	Встраиваемые системы управление		БД, ВК	5	150	30/15/0	105	Э					5				
М-11.Модуль развития творческих способностей																	
ELC492	ТРИЗ в решении инженерных задач		БД, ВК	6	180	30/0/30	120	Э						6			
М-13.Модуль профессиональной деятельности																	
AAP173	Учебная практика		БД, ВК	2				О		2							
ЦИКЛ ПРОФИЛИРУЮЩИХ ДИСЦИПЛИН (ПД)																	
М-8.Модуль электроники и искусственного интеллекта																	

Код	Дисциплина		Комп.	Кред.	Часы	Л/П/Лаб	СРС	Форма	1	2	3	4	5	6	7	8
ELC685	Технология интернет вещей		ПД, ВК	5	150	30/0/15	105	Э							5	
ELC677	Электронные сенсоры и преобразователи	2	ПД, КВ	4	120	30/0/15	75	Э							4	
ELC807	Измерительные и контрольные устройства в системах связи	2	ПД, КВ	4	120	15/15/15	75	Э							4	
ELC585	Цифровая схемотехника	1	ПД, КВ	5	150	30/15/0	105	Э								5
ELC565	Электронный инжиниринг	1	ПД, КВ	5	150	30/0/15	105	Э								5
ELC596	Системы охранной сигнализации	1	ПД, КВ	6	180	30/0/15	135	Э								6
ELC597	Проектирование систем безопасности	1	ПД, КВ	6	180	30/0/15	135	Э								6
М-9.Модуль электроприводов и измерительных приборов																
ELC580	Основы электропривода		ПД, ВК	4	120	15/15/15	75	О							4	
ELC634	Микропроцессорные системы	2	ПД, КВ	5	150	30/15/0	105	Э								5
AUT411	Линейные системы автоматического регулирования	2	ПД, КВ	5	150	15/15/15	105	Э								5
ELC524	Программируемые логические интегральные схемы		ПД, ВК	5	150	30/0/15	105	Э								5
ELC631	Динамика и управление электроприводами	1	ПД, КВ	4	120	30/15/0	75	Э								4
ELC632	Проектирование и управление электротехническими устройствами	1	ПД, КВ	4	120	30/15/0	75	Э								4
М-10.Модуль автоматизации производства																
ELC584	Электроизмерительные приборы автоматики		ПД, ВК	5	150	30/0/15	105	Э					5			
ELC642	Напряжение и энергетика		ПД, ВК	6	180	30/0/30	120	К						6		
ELC582	Технические средства автоматизации и управления	1	ПД, КВ	6	180	30/0/15	135	Э								6
ELC635	Системы автоматизации	1	ПД, КВ	6	180	30/0/30	120	Э								6
М-13.Модуль профессиональной деятельности																
AAP102	Производственная практика I		ПД, ВК	2				О					2			
AAP183	Производственная практика II		ПД, ВК	3				О						3		
М-14.Модуль итоговой аттестации																
ECA103	Итоговая аттестация		ИА	8												8
М-12.Модуль "R&D"																
ELC594	Проектирование электротехнических устройств	1	ПД, КВ	5	150	15/15/15	105	О							5	
ELC595	Проектирование электронных средств	1	ПД, КВ	5	150	15/15/15	105	О							5	
Дополнительные виды обучения (ДВО)																
AAP500	Военная подготовка															
Итого по УНИВЕРСИТЕТУ:									32	28	31	29	29	31	31	29
									60		**60**		**60**		**60**	

Количество кредитов за весь период обучения

Код цикла	Циклы дисциплин	Кредиты			Всего
		Обязательный компонент	Вузовский компонент	Компонент по выбору	
ООД	Цикл общеобразовательных дисциплин	51	0	5	56
БД	Цикл базовых дисциплин	0	92	19	111
ПД	Цикл профилирующих дисциплин	0	30	35	65
Всего по теоретическому обучению:		**51**	**122**	**59**	**232**
ИА	Итоговая аттестация				8
ИТОГО:					**240**

Решение Учебно-методического совета КазНИТУ им. К.Сатпаева. Протокол № 3 от 20.12.2024

Решение Ученого совета института. Протокол № 1 от 22.11.2024

Подписано:

Член Правления — Проректор по академическим вопросам   Ускенбаева Р. К.

Согласовано:

Vice Provost по академическому развитию   Кальпеева Ж. Б.

Начальник отдела - Отдел управления ОП и учебно-методической работой   Жумагалиева А. С.

и.о. директора института - Институт автоматики и информационных технологий   Чинибаев Е. Г.

Заведующий(ая) кафедры - Электроника, телекоммуникации и космические технологии   Таштай Е. Т.

Представитель академического комитета от работодателей
____Ознакомлен____   Джаникеев М. С.

«APPROVED»
Decision of the Academic Council
NPJSC«KazNRTU
named after K.Satbayev»
dated 06.03.2025 Minutes № 10

SATBAYEV UNIVERSITY

WORKING CURRICULUM

Academic year	**2025-2026 (Autumn, Spring)**
Group of educational programs	**B063 - "Electrical engineering and automation"**
Educational program	**6B07104 - "Electronic and Electrical Engineering"**
The awarded academic degree	**Bachelor of engineering and technology**
Form and duration of study	**full time - 4 years**

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	lek/lab/pr Contact hours	in hours SIS (including TSIS)	Form of control	1 course 1 sem	1 course 2 sem	2 course 3 sem	2 course 4 sem	3 course 5 sem	3 course 6 sem	4 course 7 sem	4 course 8 sem	Prerequisites
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)																	
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)																	
M-5. Module of anti-corruption culture, ecology and life safety base																	
CHE656	Ecology and life safety	1	GED, CCH	5	150	30/0/15	105	E			5						
HUM136	Fundamentals of anti-corruption culture and law	1	GED, CCH	5	150	30/0/15	105	E			5						
MNG489	Fundamentals of economics and entrepreneurship	1	GED, CCH	5	150	30/0/15	105	E			5						
ELC577	Fundamentals of scientific research methods	1	GED, CCH	5	150	30/0/15	105	E			5						
MNG564	Basics of Financial Literacy	1	GED, CCH	5	150	30/0/15	105	E			5						
M-1.Module of language training																	
LNG108	Foreign language		GED, RC	5	150	0/0/45	105	E	5								
LNG104	Kazakh (russian) language		GED, RC	5	150	0/0/45	105	E	5								
LNG108	Foreign language		GED, RC	5	150	0/0/45	105	E		5							
LNG104	Kazakh (russian) language		GED, RC	5	150	0/0/45	105	E		5							
M-2.Module of physical training																	
KFK101	Physical culture I		GED, RC	2	60	0/0/30	30	E	2								
KFK102	Physical culture II		GED, RC	2	60	0/0/30	30	E		2							
KFK103	Physical culture III		GED, RC	2	60	0/0/30	30	E			2						
KFK104	Physical culture IV		GED, RC	2	60	0/0/30	30	E				2					
M-3.Module of information technology																	
CSE677	Information and communication technology		GED, RC	5	150	30/15/0	105	E				5					
M-4.Module of socio-cultural development																	
HUM137	History of Kazakhstan		GED, RC	5	150	15/0/30	105	GE	5								
HUM132	Philosophy		GED, RC	5	150	15/0/30	105	E			5						
HUM120	Module of socio-political knowledge (sociology, political science)		GED, RC	3	90	15/0/15	60	E			3						
HUM134	Module of socio-political knowledge (cultural studies, psychology)		GED, RC	5	150	30/0/15	105	E				5					
CYCLE OF BASIC DISCIPLINES (BD)																	
M-6.Module of physical and mathematical training																	
MAT101	Mathematics I		BD, UC	5	150	15/0/30	105	E	5								
PHY111	Physics I		BD, UC	5	150	15/15/15	105	E	5								

Code	Name	Gr	Cycle	Cr	Hrs	L/P/L	SIW	Form	1	2	3	4	5	6	7	8	Prereq
PHY112	Physics II		BD, UC	5	150	15/15/15	105	E		5							PHY111
MAT102	Mathematics II		BD, UC	5	150	15/0/30	105	E		5							MAT101
MAT423	Mathematics		BD, UC	5	150	15/0/30	105	E			5						
M-7.Module of basic training																	
GEN429	Engineering and computer graphics		BD, UC	5	150	15/0/30	105	E	5								
ELC589	Theoretical Foundations of Electrical Engineering I		BD, UC	6	180	15/15/15	135	R		6							
ELC587	Simulation software	1	BD, CCH	5	150	15/15/15	105	R		5							
ELC588	Simulation of electronic circuits in MatLab and other software products	1	BD, CCH	5	150	15/15/15	105	R		5							
MNG563	Fundamentals of sustainable development and ESG projects in Kazakhstan	1	BD, CCH	5	150	30/0/15	105	E		5							
ELC590	Theoretical Foundations of Electrical Engineering II		BD, UC	5	150	15/15/15	105	R			5						
ELC544	Physical fundamentals of electronics		BD, UC	5	150	15/15/15	105	E			5						
ROB504	High-level Programming	1	BD, CCH	5	150	30/15/0	105	E				5					
ROB505	Methods of Computation and Programming	1	BD, CCH	5	150	15/15/15	105	E				5					
CSE831	Fundamentals of Artificial Intelligence	1	BD, CCH	5	150	15/0/30	105	E				5					
ELC802	Inclusive technologies and universal design in engineering systems	1	BD, CCH	5	150	30/0/15	105	E				5					
M-8.Module of electronics and artificial intelligence																	
ELC479	Introduction to Electronic Science and Engineering		BD, UC	4	120	30/0/15	75	E		4							
ELC573	Fundamentals of electronics and measuring technique		BD, UC	5	150	15/15/15	105	E			5						
ELC591	Electronics and circuitry		BD, UC	5	150	15/15/15	105	R				5					
ELC100	Fundamentals of optoelectronics		BD, UC	5	150	15/0/30	105	E				5					
ELC574	Electrical devices		BD, UC	5	150	30/0/15	105	E					5				
ROB411	Embedded system programming	1	BD, CCH	5	150	15/15/15	105	E				5					
ROB195	Programming for microcontrollers	1	BD, CCH	5	150	30/15/0	105	E				5					
MNG562	Legal regulation of intellectual property	1	BD, CCH	5	150	30/0/15	105	E				5					
M-9.Module of electric drives and measuring devices																	
ELC578	Digital control of the electric drive	1	BD, CCH	4	120	30/0/15	75	E						4			
ELC579	Frequency control of the electric drive	1	BD, CCH	4	120	30/0/15	75	E						4			
M-10.Module of production automation																	
AUT424	Basics of automation		BD, UC	5	150	30/15/0	105	E				5					
ELC581	Power electronics in automation		BD, UC	4	120	30/0/15	75	E				4					
ELC633	Embedded control systems		BD, UC	5	150	30/15/0	105	E					5				
M-11.Module of creativity development																	
ELC492	TRIZ in solving engineering problems		BD, UC	6	180	30/0/30	120	E						6			
M-13.Module of professional activity																	
AAP173	Practical training		BD, UC	2				R		2							
CYCLE OF PROFILE DISCIPLINES (PD)																	
M-8.Module of electronics and artificial intelligence																	
ELC685	Technology Internet of things		PD, UC	5	150	30/0/15	105	E					5				
ELC677	Electronic sensors and transducers	2	PD, CCH	4	120	30/0/15	75	E					4				
ELC807	Measuring and control devices in communication systems	2	PD, CCH	4	120	15/15/15	75	E					4				
ELC585	Digital circuitry	1	PD, CCH	5	150	30/15/0	105	E						5			
ELC565	Electronic engineering	1	PD, CCH	5	150	30/0/15	105	E						5			
ELC596	Security alarm systems	1	PD, CCH	6	180	30/0/15	135	E							6		
ELC597	Design of security systems	1	PD, CCH	6	180	30/0/15	135	E							6		
M-9.Module of electric drives and measuring devices																	
ELC580	Basics of electric drive		PD, UC	4	120	15/15/15	75	R					4				

Code	Name		Comp.	Cr.	Hours	Distr.		Type	S1	S2	S3	S4	S5	S6	S7	S8
ELC634	Microprocessor systems	2	PD, CCH	5	150	30/15/0	105	E							5	
AUT411	Linear System of Automatic Control	2	PD, CCH	5	150	15/15/15	105	E							5	
ELC524	Programmable logic integrated circuits		PD, UC	5	150	30/0/15	105	E								5
ELC631	Dynamics and control of electric drives	1	PD, CCH	4	120	30/15/0	75	E								4
ELC632	Design and management of electrotechnical devices	1	PD, CCH	4	120	30/15/0	75	E								4
M-10. Module of production automation																
ELC584	Electric measuring instruments of automation		PD, UC	5	150	30/0/15	105	E						5		
ELC642	Voltage and energy		PD, UC	6	180	30/0/30	120	C								6
ELC582	Technical means of automation and control	1	PD, CCH	6	180	30/0/15	135	E								6
ELC635	Automation systems	1	PD, CCH	6	180	30/0/30	120	E								6
M-13. Module of professional activity																
AAP102	Production practice I		PD, UC	2				R						2		
AAP183	Production practice II		PD, UC	3				R							3	
M-14. Module of final attestation																
ECA103	Final examination		FA	8												8
M-12. Module of "R&D"																
ELC594	Design of electrotechnical devices	1	PD, CCH	5	150	15/15/15	105	R							5	
ELC595	Design of electronic means	1	PD, CCH	5	150	15/15/15	105	R							5	
Additional type of training (ATT)																
AAP500	Military training															
Total based on UNIVERSITY:									32	28	31	29	29	31	31	29
									60		**60**		**60**		**60**	

Number of credits for the entire period of study

Cycle code	Cycles of disciplines	Credits			
		Required component (RC)	University component (UC)	Component of choice (CCH)	Total
GED	Cycle of general education disciplines	51	0	5	56
BD	Cycle of basic disciplines	0	92	19	111
PD	Cycle of profile disciplines	0	30	35	65
Total for theoretical training:		**51**	**122**	**59**	**232**
FA	Final attestation				8
TOTAL:					**240**

Decision of the Educational and Methodological Council of KazNRTU named after K.Satpayev. Minutes № 3 dated 20.12.2024

Decision of the Academic Council of the Institute. Minutes № 1 dated 22.11.2024

Signed:

Governing Board member - Vice-Rector for Academic Affairs — Uskenbayeva R. K.

Approved:

Vice Provost on academic development — Kalpeyeva Z. Б.

Head of Department - Department of Educational Program Management and Academic-Methodological Work — Zhumagaliyeva A. S.

acting Director of Institute - Institute of Automation and Information Technologies — Chinibayev Y. Г.

Department Chair - Electronics, telecommunications and space technologies — Tashtay Y. .

Representative of the Academic Committee from Employers ____Acknowledged____ — Dzhanikeyev M. S.