

Bachelor
field of knowledge "AUTOMATION AND INSTRUMENTATION"
in specialty «AUTOMATION AND COMPUTER INTEGRATED TECHNOLOGIES»
Educational-professional Program
«Automation and Computer Integrated Technologies»

Form of Training:	Licensed number of persons:
– Full-time	50
– Part-time	50
Duration of Training	4 years
Credits	240 ECTS
Language of Teaching	Ukrainian
Qualification	Junior Engineer Automation and Computer Technologies

Concept of training

The educational process is based on a systems approach and interdisciplinary training principles to foster students' broadmindedness non-standard thinking, the ability to solve overhead and socio-economic problems and meet the needs of modern production and the labor market.

Practical training

Practical training is carried out in educational and research facilities of the university and the leading enterprises like poultry "Ukraine", "Kiev", "Havrylivski" Greenhouse "Pusha Vodytsya".

Proposed Topics for Bachelor theses

1. Development of automatic control of temperature in the installation for the production of milk.
2. Development of automatic control of temperature in a pigsty, the mother liquor.
3. Development of automatic control of temperature in the greenhouse.

Academic rights of Graduates: graduates can apply for Master's Degree Specialties and Educational programs specified in Table 1.2 Section 1.3 this Catalog.

Employment of Graduates

Activities are subject to generalized systems of automation and computer-integrated technologies. Professionals trained to work in the following sectors: - Engineer with automated production management, Manager - informant - techniques of configuring computer systems.

**Bachelor`s Program and Curriculum in Specialty
"Automation and Computer Integrated Technologies"
Educational Program «Automation and Computer Integrated Technologies»**

Code n/a	Components of the educational and professional program (education disciplines, course projects (paper), practice, qualification work)	Amount of credits ECTS	The final control
1	2	3	4
1. GENERAL TRAINING CYCLE			
Compulsory components EPP			
CC 1.	Ecology	3,0	exam
CC 2.	High Maths	15,0	exam
CC 3.	Numerical Methods	4,0	exam
CC 4.	Physics	8,0	exam
CC 5.	Chemistry	3,0	exam
Compulsory components EPP by decision of the Academic Council of the University			
CCU 1.	History of Ukraine and Ethnocultural	4,0	exam
CCU.2.	Ukrainian Language (for professional purposes)	4,0	exam
CCU 3.	Philosophy	4,0	exam
CCU 4.	Foreign Language	6,0	exam
CCU.5.	Physical Education	10,0	test
2. SPECIAL (PROFESSIONAL) TRAINING CYCLE			
Compulsory components EPP			
CC 6.	Technology of production, storage and processing of agricultural products	4,0	exam
CC 7.	Engineering Graphics	4,0	exam
CC 8.	Computer Technologies and Programming	10,0	exam
CC 9.	Electrical Engineering and Electromechanics	8,0	exam
CC 10.	Electronics and Microprocessor Technics	10,0	exam
CC 11.	Automation Systems Design	8,0	exam
CC 12.	Theory of automatic Control	10,0	exam
CC 13.	Technical Means of Automation	5,0	exam
CC 14.	Metrology, Measurement Technology and Instruments	8,0	exam
CC 15.	Identification and Modeling of Technological Objects	6,0	exam
CC 16.	Automation of Technological Processes and Productions	7,0	exam
CC 17.	Microprocessor Devices Control	3,0	exam
CC 18.	Automated Control Systems	3,0	exam
CC 19.	Computer Integrated Technologies	7,0	exam
CC 20.	Information and Measuring Systems	3,0	exam
CC 21.	Optimization of Control Systems Modelling	3,0	exam
CC 22.	Educational practice	10,0	exam
CC 23.	Internship	5,0	exam
CC 24.	Preparation and defense of a bachelor's thesis	5,0	Defense of qualification work
The total amount of Compulsory components		180	
Optional components EPP			
Optional components by specialty			
OB 1.1.	Labor and life safety	5,0	exam
OB 1.2.	Data transmission systems and networks	5,0	exam
OB 2.1	Computer graphics	4,0	exam
OB 2.2.	Technical means of information transmission.	4,0	exam
OB 3.1.	Theoretical and applied mechanics	4,0	exam
OB 3.2.	Electrical and structural materials.	4,0	exam
OB 4.1.	Basics of operation and repair of power equipment	4,0	exam
OB 4.2.	Heat engineering and hydraulics	4,0	exam
OB 5.1.	Automated electric drive	4,0	exam
OB 5.2	Electrified technologies in agriculture	4,0	exam

OB 6.1	Computer hardware, server systems and networks	4,0	exam
OB 6.2.	Organization of databases and knowledge	4,0	exam
OB 7.1.	Political Science and Sociology	3,0	test
OB 7.2.	Economics and organization of energy services of companies.	3,0	test
OB 8.1	Legal culture of the individual	4,0	exam
OB 8.2.	International economics	4,0	exam
OB 9.1.	Information theory	4,0	exam
OB 9.2.	3D modeling	4,0	exam
OB 10.1.	Digital information technologies in electrical power systems.	4,0	exam
OB 10.2.	Actuators of control systems	4,0	exam
OB 11.1.	CAD Basics	4,0	exam
OB 11.2	Basics of systems analysis	4,0	exam
OB 12.1	Basics of power supply for agro-industrial complex	3,0	exam
OB 12.2.	Fundamentals of Scientific Research	3,0	exam
OB 13.1.	Diagnostics and service of electrical equipment.	4,0	exam
OB 13.2.	Basics of technical operation of automation systems	4,0	exam
OB 14.1.	Management	3,0	test
OB 14.2.	Economics of automated production in the agro-industrial complex	3,0	test
Optional components by Student's Choice			
OB 2.1.	<i>Selective discipline 1</i>	3,0	exam
OB 2.2.	<i>Selective discipline 2</i>	3,0	exam
Total		60	
THE TOTAL AMOUNT OF EPP (without military training)		240	

Annotations of Components in the curriculum

1. GENERAL TRAINING CYCLE

Compulsory components

Ecology. Legal and organizational questions of natural environment protection. Theoretical bases of ecology. Global problems of ecology: problems of the population, power resources exhausting, the physical contents of " Greenhouse effect ", the physical contents of formation Ozone gaps. Concept of toxic substances. Hydrosphere protection. Atmosphere protection. Ecological monitoring systems. The agricultural production and its influence on the environment. Economic and legal aspects of rational wildlife management. Power and its influence on the environment. Bases of without waste technologies. Ecological examination of projects and technologies. Economic efficiency of nature protection actions.

High Maths. Elements of linear, vector algebra and analytical geometry. Differential calculus of function of one and several variables. Complex numbers. Transformation Laplas, numbers on orthogonal system, conformity between operations above originals and images. Integral calculus of function of one and several variables. Differential equations, differential equations systems. Numerical and functional numbers. The harmonious analysis.

Numerical Methods. linear system of algebraic equations. Elementary transformation system. The algorithm of Gauss method and its application. Harmonic analysis. Methods of data processing.

Physics. Physical foundations of classical mechanics. Foundations of molecular physics and thermodynamics. Electricity and Magnetism. Physics of oscillations and waves. Optics. Basics of Atomic physics and Quantum mechanics. Principles of solid state physics. Theory of relativity. Basics of nuclear physics and nuclear energy.

Chemistry. Structure of atoms, molecules, substances, their modular condition. Chemical reactions. Solutions of electrolytes and non-electrolytes. Corrosion and protection of materials and alloys. Concept PH. Electrochemical processes.

Compulsory components by decision of the Academic Council of the University

Annotations of components: «History of Ukraine and Ethnocultural», «Ukrainian Language (for professional purposes)», «Philosophy», «Foreign Language», «Physical Education». see Section 2.1.

2. SPECIAL (PROFESSIONAL) TRAINING CYCLE

Compulsory components

Technology of production, processing and storage of agricultural products. Technologies for the production of crop products. Technologies for the production of livestock and poultry products. Technologies for processing and storage of crop, livestock and poultry products.

Engineering Graphics. Projective drawing. Views, cuts and intersects. Sketches and working drawings. Assembly drawing. Detail drawing. The drawing by means of AutoCAD system.

Electrical Engineering and Electromechanics. Electrical and magnetic fields. Electrical circuits. Calculation of direct current electrical circuits. Multi-poles network. Nonlinear circuits. Calculation of circuits at alternative currents and voltage. Transients in linear circuits and their calculation. Calculations of nonlinear circuits. Transients in nonlinear circuits.

Automation Systems Design. Automation circuits, choice of methods for complex technical automation facility during designing and automation system analysis.

Metrology, Measurement Technology and Instruments. The legislative and normative acts in metrology. General problems of measurement and errors. The theory and practice of measurement precision and measurement systems. Analogue measuring apparatuses. Measuring mechanisms. Registering devices. Digital devices. Measuring of electrical and magnetic magnitude.

Identification and Modeling of Technological Objects. The classification of technological and manufacturing processes as objects of automatic control. Construction of static and dynamic objects of agricultural technological processes and production.

Automation of Technological Processes and Productions. Classification and structure of the modern atomic technological processes; the basic automatic characteristics of standard technological processes; automation problems in standard technological processes; automation of specific standard technological processes.

Information and measuring systems. Modern information-measuring systems, included in complex software and hardware complexes, consist of technical means for obtaining experimental information, a technical object and a computer system. Computer systems in such complexes perform the functions of managing processing, displaying and storing information, exchanging data with computer networks, building information and expert systems, modeling and researching computer models, planning, forecasting, diagnostics, design, construction, training. and solve many other problems.

Modeling and optimization of control systems. Formulation of optimal and adaptive control problems, reasonably choosing an optimization method, the AOSAC synthesis method, developing algorithms for the operation of AOSAC, knowing the main tasks of the AOC of thermal power plants, nuclear power plants and industrial enterprises, being able to design software for AOC subsystems in automated process control systems.

Computer-integrated technologies. Creation and operation of computer-integrated control systems that provide solutions to problems of coordinating the functioning of subsystems, the use of intelligent decision support subsystems based on databases and knowledge and their management systems. Computer-integrated technologies are closely related to automatic control and process automation systems in various industries and production.

Automated control system. Classification and structure of modern automated control systems; types of ACS support; ACS of specific objects and production processes in livestock farming, crop production and feed production; functional automation diagrams; formulation of ACS tasks

Microprocessor control devices. Passive electronic elements. Semiconductor diodes, transistors, thyristors. Photoelectric, optoelectronic and indicator devices. Electronic amplifiers. Digital and pulse devices. Food supplies. Microprocessor devices.

Optional components by specialty

Legal culture of the individual. Patterns of development of state and law, certain areas of Ukrainian legislation. Characteristics of constitutional, labor, environmental, land, civil, administrative, criminal and family law.

Labor and life safety. Legislative and regulatory framework of Ukraine on labor protection. State management of labor protection and organization of labor protection in production. Explosion hazard of production, explosion protection. Fire safety. Electrical safety. Occupational hygiene and industrial sanitation. State supervision and public control over labor protection. Providing first aid to victims of accidents.

Information theory. Entropy as the degree of uncertainty in the state of a system. Entropy and information. Methods for measuring the amount of information. Methods for encoding information during transmission. The relationship between the amount of information and the length of the code that provides a given reliability at a given level of interference. Calculations of communication and control channel capacity.

Fundamentals of scientific research. Methodological basis for organizing scientific research. Specifics of research activities. General methodology of scientific research. Principles of working with scientific information. General requirements for writing and formatting scientific papers.

Theoretical and applied mechanics. Mechanics. Theory of devices and machines. Mechanics of materials and structures. Machine details.

Economics of automated production in the agro-industrial complex. Economic efficiency of investments in the energy sector. Economic mechanism. Planning of labor and wages in the energy sector Profit, profitability, financial activities in electricity. Energy planning. Restoration of basic income expenditure.

Executive control mechanisms. Classification. Features of selection and calculation. Device, design features. Control.

Electrified technologies in the agro-industrial complex. Basics of converting electrical energy into heat. Calculation of electric heating installations. Direct, indirect, electric arc, induction, dielectric, thermoelectric heating.

Fundamentals of technical operation of automation systems. Regulatory framework and problems of equipment operation. Energy equipment in the agro-industrial

complex, optimization and reliability. Maintenance and repair of equipment. Organization of commissioning works, acceptance tests and operation of rural energy facilities.

Heat engineering and hydraulics. Thermal and color parameters of the state. Thermodynamic processes. The first and second laws of thermodynamics. Wet air. Cycles of heat engines and refrigeration machines. Heat transfer theory. Thermal conductivity, convection. Thermal radiation. Heat exchangers. Sources of thermal energy. Boiler installations. Heat generators, Heat treatment of products. Renewable energy sources: solar energy, wind energy, biogas, energy-saving technologies.

Computer software, server networks and systems. The scope of use of PCs and computer technologies, bases for working with software, database management systems. Working on a computer network.

Computer graphics. The use of computer tools when performing tasks that include the creation of graphic objects of various types. Modeling of instrument making products using geometric and computer methods. Construction and design of their technical drawings and diagrams in accordance with existing standards. Use of information design systems in your professional activities.

Fundamentals of system analysis. Creation of mathematical models of the subject area of information systems, in particular, automation systems for design work, and belongs to the cycle of disciplines of professional and practical training.

Political science and sociology. The acquisition of knowledge about the mechanisms of functioning of society, its institutions and social groups, the development of the ability to analyze and predict the development of social processes are the most important conditions for the formation of an active life and civic position of future specialists.

Electrical and structural materials. The overall goal of the discipline teaching program is to provide students with the opportunity to master the theoretical foundations of the formation of the structure and properties of the most common metallic and non-metallic materials, study the areas of their application, and also acquire practical skills in the targeted management of the structure and properties of materials

Basics of operation and repair of power equipment. Preparing students for independent work, making qualified decisions on the effective operation of heat and power devices and systems. Formation of students' theoretical knowledge of the rules of operation of boiler plants, autonomous sources of thermal energy, heating networks and gas facilities; regulatory documents for the technical operation of heat power equipment, heat and gas supply systems Providing students with practical skills to ensure trouble-free operation of heat power equipment and heat and gas supply networks; taking appropriate measures in the event of equipment malfunctions, as well as in emergency situations; resolving issues of organizing repair work on boiler room equipment and heat and gas supply systems, taking into account environmental requirements and rational environmental management.

Economics and organization of energy services of companies. Economic efficiency of investments in the energy sector. Economic mechanism. Planning of labor and wages in the energy sector Profit, profitability, monetary activity in the energy sector. Energy planning. Restoration of basic income expenditure. General issues of assessing the energy efficiency of the functioning of energy systems of the agro-industrial complex, including those using renewable and secondary energy sources, are considered. Methods for determining the efficiency of power systems are outlined. The features and problems of financial and economic analysis of agricultural objects are analyzed.

Technical means of information transmission. General information about telecommunication systems. Generalized system of digital communication system. Messages, signals, interference and their mathematical models. Mathematical models of

telecommunication channels. Fundamentals of information theory. Methods and methods for encoding messages. Transmission of messages in digital systems. Noise immunity of modern telecommunication systems. Principles of multichannel communication and their implementation in analog and digital systems. Efficiency of the telecommunication system. Elements of SEZ design.

3D modeling. 3D modeling in AutoDesk Inventor, SolidWorks. Creation of 3D models of installations for various fields of application.

Management. The essence, principles and functions of modern management. Management tools. Organizational structure of public management. Public management in the field of information industry. Activities of management participants.

Organization of database and knowledge. Database systems. Basic concepts and architecture. Data models. Relational data model. The theory of normalization of the relational data model. Query languages: SQL and QBE. Database design. Data integrity. Database protection. Navigation data processing. Databases: distributed, parallel, deductive, object-oriented, online. Basic knowledge.

Digital information technologies in electrical power systems. Microcontrollers: main types, design and use. Microcontroller buses. Data transfer. Digital information systems at electrical power facilities, digital substations. Programmers. Programming in machine codes. Development environment Visual Studio Code (PlatformIO IDE). Use of microcontrollers in electrical power systems. Process control systems for digital substations. Principles of development of integrated systems.

Diagnostics and service of electrical equipment. Operational reliability of different types of electrical equipment. Methods for monitoring the performance of electrical equipment. Instrumentation for test measurements and testing of electrical equipment. Modeling of emergency operating modes. Algorithms for troubleshooting technical products.

CAD Basics. Classification of CAD systems by purpose and functionality. CAD information structure. Subsystems included in CAD. CAD software. Models and algorithms for calculating the physical properties of media used in CAD. Structure and functionality of computer-aided design systems for measuring temperature and pressure levels.

Fundamentals of power supply to the agro-industrial complex. The discipline includes: general information about the production, transmission, distribution and consumption of electrical energy; power supply problems; reliability of power supply to enterprises and settlements; quality of electrical energy in electrical networks; electrical loads of networks; economical operation of electrical networks; elements of electrical networks; calculation of electrical networks; voltage regulation in electrical networks; calculation of overhead lines for mechanical strength; transient processes in electrical networks; backup and non-traditional sources of electricity; means of protecting power supply systems from emergency conditions; relay protection and automation of power supply systems

international economics. The purpose of teaching is to form a system of theoretical and applied knowledge about the modern role, functional content and tools of the international economy in a highly competitive environment, the patterns of development of the modern world economy. The main objectives of studying the discipline are to form in students a holistic understanding of the specifics of international activity; students' mastery of the categorical apparatus used in international trade; formation of a system of knowledge about the theoretical foundations of analyzing the international environment and assessing its attractiveness for carrying out foreign economic activity.

Automated electric drive. Modern methods and means of control in electromechanical automation systems of technological objects. Structural, functional and methodological principles of construction and operation of automated electromechanical

systems. Mechanical and electromechanical characteristics of constant and alternating current electric motors. Adjusting the coordinates of the electric drive and the electric drive control system.

