

**NONCOMMERCIAL JOINT-STOCK COMPANY "ALMATY
UNIVERSITY OF POWER ENGINEERING &
TELECOMMUNICATIONS"**

«Agreed»

Corporation «Saiman»

Technical director

R.M. Musin

2019



«Approved»

Rector of AUPET

S.S. Sagintayeva

2019



**PASSPORT
«MODULAR EDUCATIONAL PROGRAM
HIGHER EDUCATION
6B07109 – INSTRUMENT MAKING»**

Duration of education 4 years

Academic degree: *Bachelor of Engineering and Technology, specialty 6B07109 – «Instrument making»*

Qualification level in accordance with the Sectoral Framework of Qualifications: *5-6 level*

Almaty 2019

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1. The purpose of the educational program

The purpose of the educational program consists of the following components:

- satisfaction of the individual's need for intellectual, cultural and moral development by obtaining higher education in the field of instrument-making;
- the organization of special training, which allows graduates to continue their studies in the magistracy with the prospect of defending a thesis for a master's degree, and to start productive professional activity in the specialty obtained;
- satisfaction needs of the society in qualified specialists with higher education in the specialty 5B071600 - Instrument making.

2. Objectives of the educational program

The educational program in the specialty 6B07109 - «Instrument making» is aimed at the following tasks in the field of professional activity:

. To give knowledge and skills in the field of instrument making, including elements of the most advanced and modern scientific discoveries and technologies for creating new instruments and conducting scientific research:

- calculation and design of parts and units in accordance with the technical specification using standard design automation tools;
- development of design and working technical documentation, design of finished design and construction work using the methods of scientific experiment;
- participation in work on the development and mastery of technological processes in the course of preparation of production of new products;
- evaluation of innovative potential of new products;
- study of scientific and technical information, domestic and foreign experience on the subject of research;
- mathematical modeling of processes and objects on the basis of standard packages of computer-aided design and research;
- carrying out experiments using a specified technique, analyzing the results;
- carrying out measurements and observations, drawing up a description of ongoing research, preparing data for compiling reviews, reports and scientific publications;
- drawing up a report on the task completed, participating in the implementation of research and development results;
- organization of work of small teams of performers;
- carrying out of the analysis of expenses and results of activity of industrial divisions;

Prepare a specialist able to maintain and operate modern equipment in industrial enterprises, and specifically:

- organization of workplaces, their technical equipment, placement of technological equipment;
- control over observance of technological discipline;
- maintenance of industrial controllers of various foreign companies;
- programming of microcontroller control;
- programming of industrial controllers;
- organization of metrological support of technological processes, use of standard methods of quality control of products;
- preparation of documentation on quality management of technological processes at production sites;
- control over compliance with environmental safety;
- preparation of initial data for the selection and justification of scientific and technical and organizational and planning calculations for the establishment (reorganization) of production sites;

- development of operational plans for production units.

Prepare a specialist for labor activities in the preparation, reading and modification of design documentation for devices and devices, and specifically:

- collection and analysis of information source data for design;
- control of conformity of the projects and technical documentation being developed to standards, technical conditions and other normative documents;
- conducting preliminary feasibility study of design calculations;
- preparation of technical documentation, as well as established reporting on approved forms.

3. List of possible posts after mastering the educational program

The names of the possible positions of the graduate: Bachelors can occupy the primary positions of engineering, design engineering, technique for setting up, testing the first category, laboratory technicians and technicians of research institutions, design, and design organizations without requiring the work experience.

The sphere of professional activity of graduates are research and educational institutions, production, all branches, including military-industrial, industry, transport and communications, rural and communal services, medicine, education and consumption.

The objects of professional activity are educational institutions, scientific research institutions, enterprises and organizations of all branches, including military-industrial, industry, transport and communications, rural and communal services, medicine, education and consumption, design organizations, firms of various forms of ownership

The subjects of professional activity are:

- physical methods and devices for the control and analysis of substances and products;
- mechatronic, electronic, electronic-mechanical, magnetic, electromagnetic, acoustic and acousto-optic instruments and systems;
- biotechnical and medical apparatus;
- element base of electronic engineering and instrument making;
- electronic technologies;
- aviation devices and devices of automation systems, technology of automated production of elements, devices and systems.

4. Documents regulating the requirements for the competencies of the graduate

Baccalaureate graduate is awarded an academic degree of Bachelor of Engineering and Technology in the specialty "6B07109-Instrument making". Qualifications and positions are determined in accordance with the Order of the Minister of Education and Science of the Republic of Kazakhstan № 338 of July 13 2009, "On approval of the Model Qualification Characteristics of the Positions of Pedagogical Workers and Equal Persons", as amended on June 9, 2011, by the Order of the Deputy Prime Minister of the Republic of Kazakhstan - Minister of Industry and New Technologies of the Republic of Kazakhstan dated March 13, 2014 No. 74. The modular educational program is developed on the basis of the laws of the Republic of Kazakhstan and normative documents: the State Compulsory Standard of Higher Education, the State Compulsory Standard of Postgraduate Education (resolution of the Government of RK of August 23, 2010 No. 1080), the Model Rules for the Activity of the Higher and Post-Graduate Education Organization (resolution of the Government of the Republic of Kazakhstan of 17.05.2013 No. 499), the Rules for the organization of the educational process on the credit technology of instruction (Order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152) The requirements for a graduate with an academic degree Bachelor of Engineering and Technology in the specialty "6B07109-Instrument making".

5. Contents, types and directions of professional activity

Bachelor of Engineering and Technology in the specialty "6B07109-Instrument making" can perform the following types of professional activity:

- calculation and design;
- industrial and technological;
- experimental research;
- organizational and managerial;
- educational (pedagogical).

Specific activities are determined by the content of educational and professional programs developed by the university.

Functions of professional activity of graduates:

- development and design of various types of apparatuses and complexes of Control and measuring devices, information and measuring equipment and electronic engineering, medical, aviation instruments and instruments in other fields of activity;
- maintenance, organization of preventive inspections and routine maintenance of instruments, measuring instruments, testing and control;
- development of design, technological and operational documentation, new technologies, testing techniques for equipment and instruments;
- analysis of the state of devices, systems and complexes, and an assessment of the stability of their work quality with a view to further developing and improving the efficiency of production and operation;
- carrying out experiments, measurements, observations, the introduction of research results and scientific developments.

The content of professional activity includes the totality of means, methods and methods of calculation and design, production and technological, experimental and research activities aimed at manufacturing and servicing competitive products of Control and measuring devices based on the application of modern design methods.

Depending on the trajectory of the educational program, the graduate's professional activity is carried out in the following directions:

- instrument making, installation and adjustment of devices of automation systems;
- radio engineering devices and means;
- aviation devices and measuring and computing systems.

6. Requirements for key competencies of the graduate

The results of the educational program on specialty 6B07109- "Instrument-making" are expressed through competences based on the Dublin descriptors of the 1-st level of education (bachelor's degree), which assume the abilities:

- demonstrate knowledge and understanding in the study area, including elements of the most advanced knowledge in this field;
- apply this knowledge and understanding at a professional level;
- formulate arguments and solve problems in the area under study;
- to collect and interpret information for the formation of judgments, taking into account social, ethical and scientific considerations;
- communicate information, ideas, problems and solutions to both specialists and non-specialists.

There are five main education outcomes:

- knowledge and understanding;
- application of knowledge and understanding;
- formation of judgments;
- communication skills;
- skills of learning or ability to study.

In accordance with professional standards and on the basis of Dublin descriptors 1 level of study (bachelor's degree), the graduate must have the general competencies of higher education, which are formed on the basis of the requirements for general education, socio-ethical competencies, economic and organizational and managerial competencies and special competencies.

Requirements for general education (GE):

- to have basic knowledge in the field of natural science disciplines that contribute to the formation of a highly educated person with a broad outlook and a culture of thinking (GE -1);

- have the skills to handle modern technology, be able to use information technology in the field of professional activity (GE-2);

- have the ability to write and verbal communication, the ability to logically correctly, reasonably and clearly build oral and written speech, readiness to use one of the foreign languages (GE -3);

- have the ability, in the conditions of the development of science and changing social practices, to reassess the accumulated experience, analyze their capabilities, readiness to acquire new knowledge, use various means and technologies training; Competently form a methodology for teaching new information on special subjects (GE -4);

- the desire for self-improvement and self-development, the need and skills of independent creative mastery of new knowledge during all active life; Possess the ability to reasonably link the new technologies with the history of the development of science and the philosophy of science (GE -5);

- possess the skills to acquire new knowledge necessary for daily professional work and continuing education in doctoral studies (GE -6).

Requirements for social and ethical competences (SEC):

- know the social and ethical values based on public opinion, traditions, customs, social norms and orient oneself to them in their professional activities (SEC-1);

- comply with the norms of business ethics, own ethical and legal standards of conduct (SEC-2);

- know the traditions and culture of the peoples of Kazakhstan (SEC-3);

- be tolerant of the traditions, culture of other nations of the world (SEC-4);

- know the basics of the legal system and legislation of the Republic of Kazakhstan (SEC-5);

- to know the tendencies of social development of society (SEC-6);

- be able to adequately navigate in various social situations (SEC-7);

- be able to work in a team, correctly defend your point of view, and offer new solutions (SEC-8);

- be able to find compromises, to correlate your opinion with the opinion of the collective (SEC-9);

- have the ability to use methods of physical education and health promotion methodically, methodically to use them, readiness to achieve the proper level of physical readiness to ensure full social and professional activity (SEC-10)

- strive for professional and personal growth (SEC-11).

Requirements for economic and organizational-managerial competencies (EOMC):

- have the ability to apply knowledge and skills in management, marketing, finance, etc. (EOMC -1);

- know and understand the goals and methods of state regulation of the economy, the role of the public sector in the economy (EOMC -2);

- be able to choose and set tactical and strategic goals for the team, outline ways to achieve them (EOMC -3),

- to have the skills of business relations, the optimal division of labor and creation of temporary labor collectives, aspiration for leadership, raising their professional level (EOMC -4);

- be competent in the economic policy of production and labor organization for the optimal development of the enterprise (EOMC -5).

Requirements for the readiness to change social, economic, professional roles, geographical and social mobility in conditions of increasing dynamism of changes and uncertainties (CC):

- be able to adapt to constantly changing social, economic and other conditions (CC-1);
- be mobile and receptive to the improvement of technology and technology, to the use of scientific and technological progress (CC-2);
- evaluate the innovative potential of the products and their competitiveness (CC-3);
- use the results of research and development (CC-4).

Special competencies (SC), developed on the basis of the content of basic and profiling disciplines, are given in Table 1:

SC1:

- Knowledge: occupational safety and health, a unified system of technological preparation of production.
- Abilities and skills: to adjust their actions in accordance with the conditions of the work situation, monitoring compliance with the rules of labor protection and safe performance of work.

SC2:

- Knowledge: modern information technologies, concepts of algorithmization and programming, methods of computer modeling and device design, trends in the development of information technologies for the design of instruments and systems; methods and means of processing data arrays, the principles of a good style of writing programs;
- Abilities and skills: independently develop, solve practical problems of creating an algorithm for the operation of the device or system; to put forward various, including alternative solutions to professional problems with the application of theoretical and practical knowledge of computer science and information technology; application and effective use of programming in educational, practical and production activities, create and read a technical drawing of the device or device; to correct and supplement the design documentation of the designed product.

SC3:

- Knowledge: on the analytical and numerical solution of differential equations; about probabilistic-statistical methods of data processing; basic concepts of probability theory and discrete mathematics; about the nature and properties of electrical and electronic signals; about the nature of materials for instrument manufacture, the properties of materials for the manufacture of Control and measuring devices products; the fundamentals of technology for the production of devices, systems and complexes.
- Abilities and skills: create models of devices and systems, taking into account their hierarchical structure; to assess the adequacy and accuracy of the model; process statistical data; calculate the parameters of the mathematical model; to analyze electrical and electronic phenomena; choose materials for the manufacture of electrical and electronic devices and systems; quickly select high-quality electrical materials of specified parameters.

SC4:

- Knowledge: theoretical foundations of electrical engineering; analog and digital electronics; about the time and frequency characteristics of electronic equipment; the modes of operation and operation of electronic devices; architecture of microprocessors; classes of microprocessors; bases of programming of microprocessors of different classes; the rules for implementing the functions of Boolean logic.
- Abilities and skills: calculate and determine the electrical parameters of the circuit; selection of the necessary primary electrical and electronic equipment, including a microprocessor; design and select integrated circuits; to develop and implement simple control algorithms through a microprocessor system; organize and control the manufacture, operation

and maintenance of electrical systems, engines and electrical equipment; carry out preventive and repair work in accordance with established timetables.

SC5:

- Knowledge: normative and legal bases of the state system of standards for the design of data collection systems, methods and means for collecting and storing information, stages and methods of database design, rules for the normalization of data sets; about modern modeling tools; methods of modeling; the basic methods of processing experimental data; programming and using the capabilities of the latest computer technologies, methods and tools of computer graphics; the order of development and registration of technical documentation; normative and guidance materials on the design, development and processing of technological documentation; basic technologies for ensuring security in information systems, their capabilities, basic methods of protecting information in information systems.

- Abilities and skills: to be able to select software, methods and information resources of modeling devices and systems; skillfully use the possibilities of computer graphics in the modeling, design, testing and analysis of instruments and systems; read, correct, supplement project documentation of data collection systems; ensure the security and protection of information in the process of its transfer, processing and storage; to configure hardware and software protection at all stages of receiving, transmitting and storing data (from sensors to data warehouses).

SC6:

- Knowledge: about the main provisions of measurement theory, information and measurement technology; types and means of measurement; physical bases of measurement of various technological parameters; principles of action of the main means of measuring technological parameters.

- Abilities and skills: qualitatively determine the accuracy of instruments, limits and measurement errors; quickly and accurately identify the quality, parameters and compatibility of components; be able to carry out control measurements and demonstrate basic operations; teach users how to use the device.

SC7:

- Knowledge: about mathematical methods for processing digital signals; about the methods of organizing digital signal processing; about the technical methods of implementing digital signal processing; the principles of the action of microprocessor measuring equipment; about the development trends of microprocessor measuring equipment.

- Ability: to develop and design devices, systems and complexes, control schemes on microprocessor components; design and select the main components of the microprocessor system; be able to design devices and devices based on signal microprocessors.

SC8:

- Knowledge: methods of calculating reliability; assessment of the operation of control and monitoring systems; the analysis of reliability indicators of devices and systems; laws of control and regulation of automatic systems; principles of automatic control of technological processes.

Ability: calculating the reliability of instruments and systems; statistical processing of reliability parameters; organize measures to improve the reliability of devices and systems; to assess the stability of the system; to develop the structure of the automation system according to the specified criteria.

SC9:

- Knowledge: the rules of installation and assembly of instruments and systems; knowledge of technological regulations of production; rules for the development of electrical, assembly, structural and functional diagrams of instruments and systems; rules for diagnostics and equipment control.

- Ability: to be able to comply with the assembly order and the rules for installing the instruments to the main equipment; to introduce, control, evaluate and correct the components of the technological process; observe the order of connection to the power supply system in an

energy-saving mode and ensure reliable isolation; be able to conduct technical inspection of devices and systems; be able to conduct regular diagnostics, troubleshoot equipment; connect industrial controllers to the industrial network.

SC10:

- Knowledge: on the methodological and technological features of scientific research;
- Abilities and skills: independently develop, solve practical problems and problems of technological or methodological nature and put forward various, including alternative solutions to professional problems using theoretical and practical knowledge; to carry out research and innovation activities and procedures for integrating knowledge of various fields, to apply theoretical knowledge in a particular field

SC11:

- Knowledge: about the rules of operation of electronic devices and systems; on the technology of building industrial and computer networks; about industrial controllers and software support to them; rules for organizing SCADA systems.

- Abilities and skills: perform assembly work of the finished units and units, check the operation of the device and adjust the operation under different loads; organize proper operation and timely repair of devices and systems; develop and design computer networks, remote control and data collection systems; design diagnostic and non-destructive testing systems; to develop a distributed intelligent system.

SC12:

- Knowledge: on the procedure and rules for the design of Control and measuring devices and systems; calculation of technical, technological and information loads of measuring and measuring equipment; methods of adjusting control systems on industrial controllers.

- Abilities and skills: to ensure the implementation of supervision of Control and measuring devices and systems; observance of the given parameters of technological process of manufacture to be able to carry out adjustment of the set mode, to regulate technological processes; assess the current technical condition of the equipment according to the diagnostic information.

7. The contents of the modular educational program. Description of modules (competency matrix)

The contents of EP corresponds to the model curriculum for specialty higher education 6B07109 - "Instrument making", approved REMC Protocol №2 of "30" in June 2016 by the Ministry of Education and Science of the Republic of Kazakhstan.

Table 1 - Modular educational program of the specialty 5B071600 - Instrument making

Module Code	Module name	Competences on the module	List of disciplines (component type)	Learning Outcomes	Form of total control
IM01	Social disciplines	CC1-5; GE1-6; SEC 1-6.	<i>Required component</i>		
			Modern history of Kazakhstan	CC; GE;	State exam
			Political and social knowledge module (Cultural studies, psychology)	CC; GE;	examination
			Political and social knowledge module (Sociology, political science)	CC; GE;	examination
			Philosophy	CC; GE;	examination
			<i>The University component</i>		

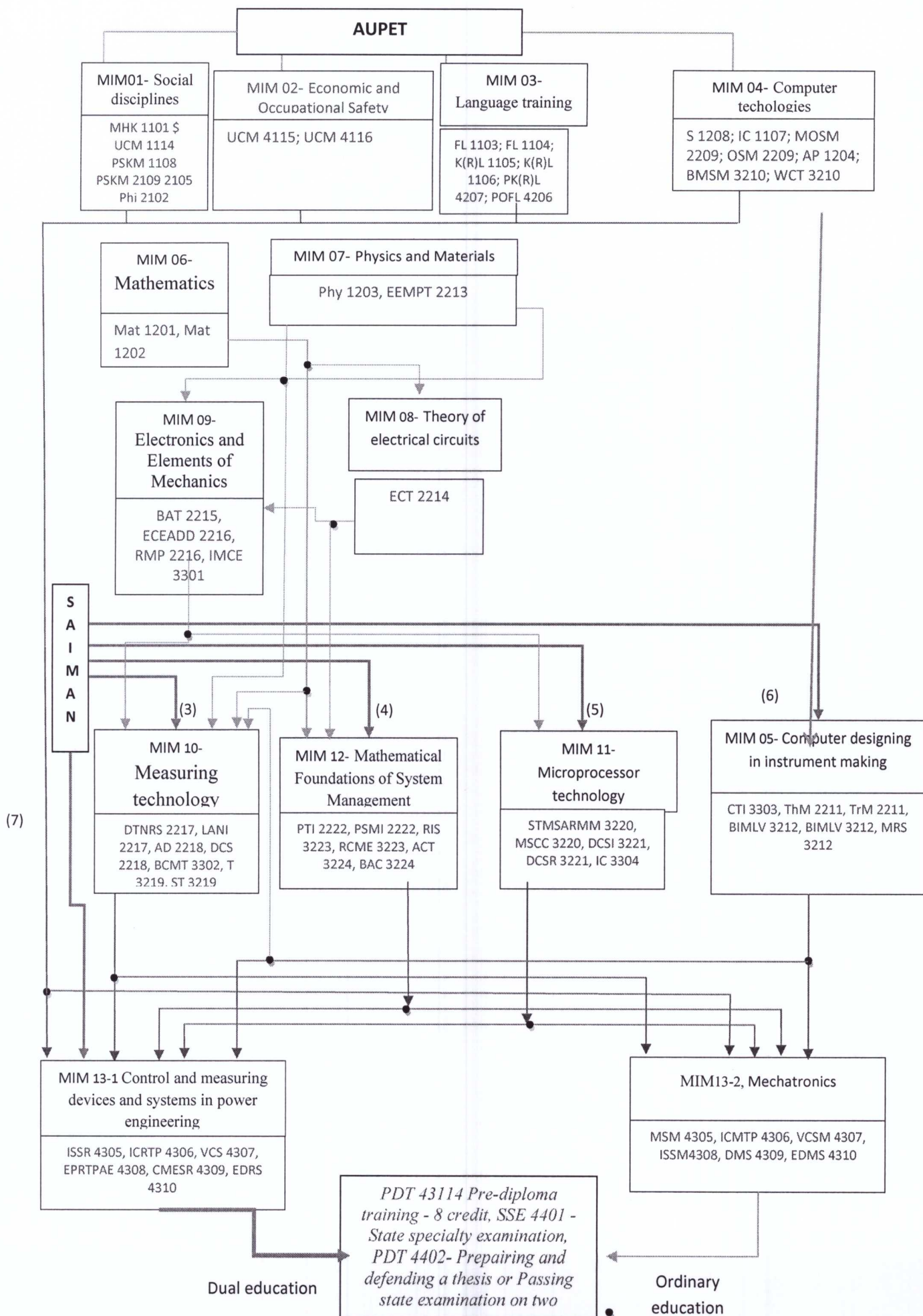
			University component module of general-education subjects (Law and anti-corruption culture basics)	CC; GE;	examination
MIM02	Economy and Labor Protection	GE1-6; EOMC1-5; SEC2-10; CC3	<i>The University component</i>		
			University component module of general-education subjects (Ecology and safety of vital activity)	GE; EOMC;	examination
			University component module of general-education subjects (economy, entrepreneurship, leadership and innovation)	GE; EOMC;	examination
MIM03	Language training	CC1-5; GE3-6;	<i>Required component</i>		
			Foreign language 1	CC; GE;	examination
			Foreign language 2	CC; GE;	examination
			Kazakh (Russian) language 1	CC; GE;	examination
			Kazakh (Russian) language 2	CC; GE;	examination
			Professional Kazakh (Russian) language	CC; GE;	examination
			Professionally-oriented foreign language	CC; GE;	examination
MIM04	Computer technologies	GE2,4,5 ; SC2-3; CC1-3.	<i>Required component</i>		
			Information and communication technologies (in english)	GE;	examination
			<i>The University component</i>		
			Solidworks - Hands-on training. Designing in AutoCAD, Solidworks	GE;SC1-3	examination
			Algorithmization and programming basics	GE;SC1-3	examination
			<i>The variational component</i>		
			Modern operating systems in microcomputers	GE;SC1-3	examination
			Operating systems in microcomputers	GE;SC1-3	examination
			<i>The variational component</i>		
			Basics of mechatronics systems modeling	SC1; SC4	examination
			Wireless communication technologies	SC1; SC4	examination
MIM05	Computer designing in instrument making		<i>The University component</i>		
			Computer technologies in instrument making	GE;SC1-3	examination
			<i>The variational component</i>		
			Technical mechanics	SC1-6;	examination
			Theoretical Mechanics	SC1-6;	examination

			<i>The variational component</i>		
			Basics of modeling devices in LabVIEW	SC1; SC4	examination
			Modeling of robotic systems	SC1; SC4	examination
MIM06	Mathematics	GE2-5; SC3	<i>The University component</i>		
			Mathematics 1	GE;	examination
			Mathematics 2	GE;	examination
MIM07	Physics and Materials	GE2-5; SC3	<i>Required component</i>		
			Physics	GE;	examination
			<i>The University component</i>		
			Electronic equipment materials and products technology	GE;	examination
MIM08	Theory of electrical circuits	GE2-5; SC4	<i>The University component</i>		
			Electrical circuits theory	GE; SC1	examination
MIM09	Electronics and Elements of Mechanics	GE2-5; SC4	<i>The University component</i>		
			Basics of additive technologies	GE; SC1	examination
			Integral and microprocessor circuit design	GE; SC1 SC6	examination
			<i>The variational component</i>		
			Elements and circuitry of analog and digital devices	SC4	examination
			Parts of robots and mechatronics	SC4	examination
MIM10	Measuring technology	SC6;	<i>The University component</i>		
			Basics of controlling and measuring technologies	SC1-6;	examination
			<i>The variational component</i>		
			Data transmission networks in robotics sustems	SC1-6;	examination
			Local area networks in instrumentation	SC1-6;	examination
			<i>The variational component</i>		
			Automated drives	SC1-6;	examination
			Drives and control systems	SC1-6;	examination
			<i>The variational component</i>	SC1; SC4	examination
			Transducers	SC1; SC4	examination
			Sensors and converters	SC1-6;	examination
MIM11	Microprocessor technology	GE3-4; SC7;	<i>The variational component</i>		
			STM series ARM microcontrollers	SC1-6;	examination
			Microprocessor control and monitoring systems	SC1-6;	examination
			<i>The variational component</i>	SC1; SC4	examination
			Data collection and storage in instrumentation	SC1; SC4	examination
			Data collection and storage in robotics	SC1; SC4	examination
			<i>The University component</i>	SC1; SC4	examination
			Industrial Controllers	SC1; SC4	examination
MIM12	Mathematical Foundations of System Management	SC3,8;	<i>The variational component</i>		
			Probability theory in instrumentation	SC1-6;	examination

			Probability and statistical methods in instrumentation	SC1-6;	examination
			<i>The variational component</i>	SC1; SC4	examination
			Reliability of instruments and systems	SC1; SC4	examination
			Reliability of controlling and measuring equipment	SC1; SC4	examination
			<i>The variational component</i>	SC1; SC4	examination
			Automatic control theory	SC1; SC4	examination
			Basics of automatic control	SC1; SC4	examination
MIM13-1	Control and measuring devices and systems in power engineering	SC4,5,9-12; GE1-6; SEC1-11; EOMC1-5	<i>The variational component</i>		
			Information security systems in robotics	SC1-6;	examination
			Industrial controllers in robotics technological processes	SC4-5;	examination
			Visual controlling software	SC1-2;	examination
			EPR technological process automation equipment	SC1-6;	examination
			Controlling and measuring equipment and systems in robotics	SC4;	examination
			Electronic devices of robotics systems	SC4;	examination
MIM 13-2	Mechatronics	SC4,5,9-12; GE1-6; SEC1-11; EOMC1-5	<i>The variational component</i>		
			Motor systems in mechatronics	SC1-6	examination
			Industrial controllers in mechatronics technological processes	SC3-5	examination
			Visual controlling software in mechatronics	SC3	examination
			Information security systems in mechatronics	SC3	examination
			Designing of mechatronics systems	SC3	examination
			Electronic devices of mechatronics systems	SC3	examination
	Practice		<i>The University component</i>		
			Manufacturing Training	SC1-6; EOMC	credit
			Manufacturing Training	SC1-SC3; SC5-6; EOMC	report
			Pre-diploma training	SC1-SC3; SC5-6; EOMC	report
MHE14	Physical education		<i>Required component</i>		
			Physical education		credit

FA	Final assessment		<i>The University component</i>		
			State specialty examination	SC1-SC3; SC5-6; GE; SEC; EOMC	defense
			Preparing and defending a thesis or Passing state examination on two majors	GE; SEC; SC1-6; EOMC	defense

8. Block diagram of a modular educational program



9. Way of choosing a trajectory

A systematic approach to constructing the structure of the educational program, the specific discipline and their content is expressed in the strict observance of the logical sequence and harmonization of the study of modules, and the provision of interdisciplinary and intermodular communication. Before the second course, the modules have a "horizontally-vertical" scheme. Modules consist of required and variable components. The result of learning after studying the module may vary depending on the selected variant component of the module. The variative part leaves possibility of possibility of change of a trajectory of training to 4 courses. On the 4th course the student studies modules in a specific direction.

There is a possibility of choosing a dual trajectory of education, as a result of which the student during the whole period of training acquires practical experience at the selected enterprise with assignment at various levels of the working specialty. After the first course, all students have training at AUPET with the qualification of a second-class radio installer. After the 2nd and 3rd courses at the enterprise, the qualification of the working specialty is assigned to a third-class radio installer, a third-class electrical installer. After the 4th year, individual students who successfully passed the courses to selected modules and passed the certification exam "Maintenance of Simatic 300, 1200, 1500 controllers" have the opportunity to receive the certificate of advanced training courses for AUPET "Programming controllers from Siemens".

The modules of the educational program are logically interrelated disciplines and are oriented towards the achievement of a certain result of training, that is, competence. The sequence of studying the modules is shown in Figure 1. Modules from MIM01 to MIM12 are necessarily variable - this means that they are studied compulsorily and upon completion of their study, students will receive the main part of the competences of the future graduate. However, along with this, they are given the opportunity to choose the disciplines of the variable component to obtain some special competencies. For example, in the module MIM02 - Economic and Occupational Safety, the student can choose the discipline UCM 4115 - University component module of general-education subjects (Ecology and safety of vital activity or UCM 4116- University component module of general-education subjects (economy, entrepreneurship, leadership and innovation), and thus master the competencies oriented in the economic direction or in the management of the organization.

In the framework of dual education, students pass the following disciplines at the "Saiman" enterprise:

- 2 course -ECT 2214« Electrical circuits theory» 5 credits;
ECEADD 2216 " Elements and circuit engineering of analog and digital devices" 5 credits;
MT 2225 Manufacturing Training 5 credit;
- 3 course - IP3220 "Measuring converters" 5 credits;
RIS 3223 «Reliability of instruments and systems» 5 credits;
CTI 3303 «Computer technologies in instrumentation» 5 credits;
PP 3403 "Industrial practice" 5 credits;
- 4 course - ISSR 4305" Information security systems in robotics" 5 credits;
ICRTP 4306 " Industrial controllers in robotics technological processes" 5 credits;
VCS 4307 « Visual controlling software» 5 credits;
EPRTPAE 4308" EPR technological process automation equipment" 5 credits;
CMESR 4309 «Controlling and measuring equipment and systems in robotics»5 credits;
EDRS 4310 «Electronic devices of robotics systems» 5 credits;

PP4404 pre-diploma practice 8 credit;
GES 4406 State examination by specialty;
NZDR 4407 degree project 2 credits.

Head of department



Chigambayev T.O.

Director of Institute



Balbayev G.K.