

**MINISTRY OF LABOR AND SOCIAL PROTECTION OF THE
POPULATION OF THE REPUBLIC OF KAZAKHSTAN**

**“DEVELOPMENT OF LABOR SKILLS AND STIMULATION OF
WORKPLACES” PROJECT**

**EDUCATIONAL PROGRAM
by specialty**

1306000-Radioelectronics and communications (by type)
(code and name of the specialty)

Professional Level qualifications: mid-level specialist

Duration of training: 2 years 10 months.

Astana, 2018

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Introduction

The President of the country N.A.Nazarbayev in a message to the people of Kazakhstan 2018: “It is necessary to develop modern standards in all major professions. In these standards, employers and businesspersons clearly consolidate what knowledge, skills and competences should have the employees. You need, based on the requirements of the professional standards, to develop new or update existing educational programs”.

This educational program is developed based on the basic normative documents defining the training content by specialty 1306000 – “Radio engineering and communication systems”:

- State Compulsory Standard on technical and vocational education, approved by the Government of the Republic of Kazakhstan dated August 23, 2012 No. 1080 (with amendments as of August 15, 2017) ;
- National Qualifications framework, approved by the Protocol dated March 16, 2016;
- Sectorial qualification framework in IT area

A distinctive characteristic of this educational program is compliance with requirements of professional social order through the creation of generic and professional competences associated with essential practical activity.

Based on the present Education Program the education organization develops working programs and curricula, using appropriate methodological recommendations for the working educational and planning documentation.

The program is designed to implement the principles of democratic administration of education, expanding the boundaries of academic freedom and the authority of the educational institutions that will ensure the adaptation of the system of technical and vocational education to the changing needs of society, the economy and the labor market. The program flexibility will take into account the ability and needs of the individual, production and society.

The educational program includes the use of modular competence-based approach based on developing and evaluating competence of students of the educational institutions in the form of basic educational outcomes, use of a module training.

Abbreviations and symbols

BC	Basic competence
BM	Basic module
HE	Higher education
SCES	The State compulsory education standard
IT	Information technology
NCO	National classifier of occupations
NQF	National Qualifications framework
NQS	National qualifications system
GM	General module
EP	Educational program
GPM	General Professional module
SQF	Sectorial Qualifications framework
PS	Professional standard
PGE	Postgraduate education
PC	Professional competence
PM	Professional module
SW	Software
WG	Working Group
RoK	The Republic Of Kazakhstan
TO	Training Outcome
SM	Special module
QMS	Quality management system
SEM	Socio-economic module
TVE	Technical and vocational education
TVE&PS	Technical and Vocational Education and Post-Secondary Education
M2M	Machine-to-Machine
SIM	Subscriber Identification Module
SLA	Service Level Agreement

Passport of the Education Program

Name (*specialty code and name*): - 1306000 – «Radio engineering and communications»

Name and code: 1306153 – «Telecommunication systems technician for M2M technology and “Internet of things»

The purpose of the education program: training of mid-level specialists that perform the work on architecture building and maintenance of the “Internet of things” and M2M

Level of education: technical and vocational

Professional qualification: Mid-level Specialist

Skill levels on NQF/SQF: 4

Professional Area activity *: Radio Engineering

Type (s) of employment:

Installation and configuration of components and software for “Internet of things” system.

Analysis of data obtained from devices of “Internet of things” system and M2M.

Localization and data transfer obtained from M2M sensors.

Maintenance of the “Internet of things” system.

Object(s) of professional activity:

Telecommunication companies;

Mobile operators;

Fixed-line operators;

Manufacturers of telecommunication equipment;

Program Features **:** The possibility to use dual forms of credit system training.

Form of study: full-time

Training terms: 2 years, 10 months.

Language of training Russian

The volume of credits/hours: 165 credits/ 4960 hours

Requirements for students***:** persons with basic secondary education

*Specifies the parameters of the SQF (methodical recommendations on the development and design of sectorial qualification frameworks, Astana, 2016).

** Specifies according to PS (methodical recommendations on the design and execution of professional standards, Astana, 2017)

***Specifies the system objects (objects), phenomena, processes, and technology that aims activities.

****Specifies the dual education/distance training/credit technology

***** Specifies the previous education: basic secondary/secondary/technical and vocational education

COMPETENCY PROFILE

<p>The aim of the training: the training of mid-level professionals performing the work for the service maintenance of the “Internet of things” system and M2M</p>	<p>After completing the training program, the trainee will be able to perform system maintenance work on the “Internet of things” system and M2M</p>	
<p>The name of the section, section, group, class and subclass according to GCEA* (by professional standard):</p>	<p>Section: information and communication Section: (61) Group: (612) wireless telecommunications activities Class: (6120) wireless telecommunications activities</p>	
<p>The scope of competencies (on basic labor functions of professional standard or profession analysis) *</p>	<p>Installation and configuration of components and software of the “Internet of things” system. Analysis of data obtained from devices of the “Internet of things” system and M2M. Localization and data transmission obtained from M2M sensors. Maintenance of the “Internet of things” system.</p>	
<p>General (Basic) competencies</p>		
Competency code	Competence (in line with labor functions)	Module
BC 1	Application of professional vocabulary to make business papers in the field of professional activity.	BM 1. The use of professional vocabulary, the preparation of business papers in the field of professional activity.
BC 2	Develop and improve physical qualities	BM 2. Development and improvement of physical qualities.
BC 3	Apply the foundations of social sciences for socialization and adaptation in society and the work places	BM 3. Application of the foundations of social sciences for socialization and adaptation in society and the work places
BC 4	Reading of drawings	BM 4. Reading of drawings
BC 5	Apply basic knowledge of economics in professional activities	BM 5. Application of basic knowledge of economics in professional activities

BC 6	Understand the history, role and place of Kazakhstan in the world community	BM 6. Understanding the history, role and place of Kazakhstan in the world community
BC 7	Application of digital devices and microprocessor systems in communication technology	BM 7. The use of digital devices and microprocessor systems in communication technology
BC 8	Comply with safety regulations and labor protection	BM 8. Compliance with safety regulations and labor protection
Professional competence		
PC1	Install and configure the components of the “Internet of things”	PM 1 Installation and configuration of the “Internet of things” system components
PC 2	Install and configure the software for M2M equipment	LP 2 Installation and configuration of the software for the operation of the M2M equipment
PC 3	Install SIM card to work in the M2m equipment	PM 3. SIM card insertion to work in the M2M equipment
PC 4	Carry out service maintenance and repair of the Internet of Things platform and M2M	PM 4. Implementation of service maintenance and repair of the Internet of Things platform and M2M
PC 5	Store and transmit the data received from sensors M2M	PM 5. Storage and transmission of data obtained from sensors M2M
PC 6	Take readings from equipment on the Internet of Things platform and M2M	PM 6. Taking readings from equipment on the Internet of Things platform and M2M
PC 7	Define the technical condition of the equipment and the “Internet of things” platform M2M	PM 7. Definition of technical condition definition of the M2M equipment and the “Internet of things” platform

* The general classification of economic activities (GCEA) is a document intended for classification and coding of all economic activities.

** A brief description of labor functions that allow one to achieve the main objectives of the specialty/profession. Number of functions depends on the complexity of the profession.

After the formulation of basic and professional competencies, one should begin to identify training outcomes for each of them. In addition, one competence can be associated with multiple training outcomes.

The list of modules and learning outcomes

Basic modules			
Module name	Learning outcomes	Assessment Criteria	Modules included into the discipline
BM 1. Application of professional vocabulary drafting of business papers in the field of professional activity.	LO 1. To master grammar and terminology of Kazakh (Russian) and foreign language for communication in the sphere of their professional activities.	1. Knowing Lexico-grammatical material, necessary for professional communication	Professional Kazakh (Russian) language, Professional foreign language
		2. Understanding of the value of written and oral communication at the national and other languages	
		3. Implementation of interpersonal contact and communication the trainees of educational process in conditions of multilanguage	
	LO 2. To know the technology of translation (with dictionary) professionally oriented texts	1. Use of dictionaries for translation of texts	
		2. Use of terminology on specialty in Kazakh and other languages	
		3. Reading and translation (with dictionary) texts of professional orientation.	
	LO 3. To work with organizational, administrative, and information and reference documents using computer technology	1. Drawing up in Kazakh (Russian) and foreign languages a resume, autobiography, description, statement, complaint, power of attorney, receipt	

		2. Compliance with the basic requirements for the text of the document.	
		3. Creation of documents on the computer that meet modern requirements and established regulations	
BM 2. Develop and improve physical qualities.	LO 1. To strengthen health and abide by the principles of a healthy lifestyle.	1. Understanding and adhering to the fundamentals and culture of a healthy lifestyle	Physical education
		2. Characteristics of the physiological basis of the respiratory, circulatory and energy supply systems under muscle loads	
		3. Performing a set of exercises for general physical training	
	LO 2. To improve physical qualities and psycho-physiological abilities	1. Characteristics of the basics of physical activity and methods of its regulation	
		2. Selection and application of methods and means of physical culture to improve the basic physical qualities	
		3. Implementation of control standards and tests provided by the program	
	LO 3. To provide first aid for injuries and accidents	1. Understanding the causes of injury during exercise	
		2. Using injury prevention methods	

		3. Providing medical care for injuries	
BM 3. Application of the foundations of social sciences for socialization and adaptation in society and at the work place	LO 1. To know the basic concepts and information of philosophy, political science, cultural studies and sociology	1. Understanding the essence and essence of the concepts, categories and information of philosophy, political science, cultural studies and sociology	Physical culture
		2. Identification of problems and interrelations of the main categories and concepts of philosophy, political science, cultural studies and sociology	
		3. Analysis of various points of view	
	LO 2. To understand international political processes, the geopolitical situation and moral values, and the norms that form tolerance and an active personal stance.	1. Characteristics of the structure of the political system, history and the current state of the world and traditional religions	
		2. Determining differences in extremist, radical and terrorist ideologies	
		3. Tolerant perception of social, ethnic, religious and cultural differences	
	LO 3. To know the basic concepts and information about the main branches of law	1. Possession of the basic provisions of criminal, civil and family law and information about taxes	
		2. Understanding of responsibility for administrative and corruption offenses	

		and respect for the principles of law and order	
		3. Protection of rights in accordance with the labor law	
BM 4. Reading of drawings	LO 1. To know the rules of design PKD	1. Knowing the basic concepts of basic technological drawing.	Basic Philosophy Cultural Studies Law basics
		2. Understanding of unified system design documentation	
		3. Formulation of design rules	
	LO 2. To issue PKD in accordance with the main standards of ESKD	1. Determining the purpose of the scale. Drawing technical details	
		2. Possession of skills of design PKD.	
		3. Execution of drawings in accordance with the main standards ESKD	
	LO 3. To perform design on the plane.	1 Reading assembly drawings and circuit diagrams	
		2 Possession of design skills on the plane	
		3. Execution of schemes of drawings with projection on the plane.	
BM 5. Application of basic knowledge of Economics in professional activity	LO 1. To determine the forms and types of ownership, types of plans, basic economic indicators of enterprises	1. Understanding of the patterns and principles of market economy, tax policy, sources of inflation, milestones and content planning	Fundamentals of Economics
		2. The necessary economic calculations with the application of	

		mathematical methods to determine basic economic indicators of enterprises	
		3. Definition of basic economic indicators of enterprises	
	LO 2. To understand trends in the world economy, the main tasks of the State transition to the “green” economy	1. The development trends characteristic in the world economy	
		2. Understanding of the basic tasks of the State transition to the “green” economy	
		3. Application of basic methods of calculating gross domestic product and gross national product to move States toward a green economy	
	LO 3. To determine the possibility of success and business risk	1. Characteristics of objectives, factors, conditions, organizational-legal forms of business activities	
		2. Understanding of the factors determining the success of business activity	
		3. Writing a business plan	
BM 6. Understanding of the history, role and place of Kazakhstan in the world community	LO 1. To name the basic historical events	1. Understanding historical events from antiquity to the present time	History of Kazakhstan
		2. Disclosure of the role and place of the Kazakh people in all-Turkish community, in the system of nomadic civilization,	

		in the development of historical and cultural community of peoples of the Eurasian world	
		3. Compiling the chronology of major historical events	
	LO 2. To establish cause-and-effect relationships of historical events	1. Understanding the facts, processes and phenomena of historical events	
		2. Definition of the basic facts, processes and phenomena, reflecting and describing the integrity and consistency of the history of Kazakhstan	
		3. Determination of cause-and-effect relationships of historical events	
	LO 3. To assess achievement of independent Kazakhstan	1. Understanding the essence and purpose of political and social developments in the Republic of Kazakhstan since independence obtaining	
		2. Characteristics of achievements of the independent Kazakhstan	
		3. Evaluation of the achievements of the independent Kazakhstan	
BM 7. Application of digital devices and microprocessor	LO 1. To work with the information on the Internet	1. Understanding of the technical aspects of the use of the Internet and the notion of copyright	Computer technologies

systems in communication technology		2. Adherence to the principles of the Internet community and the behavior code on the Internet	
		3. Determining the accuracy of the information	
	LO 2. To communicate in the Internet	1. Evaluation and analysis of sites	
		2. Managing social networking, avatar, and reputation in the network.	
		3. Get information on the code of the digital world, the virtual world, on aggression on the Internet	
	LO 3. To implement digital consumption	1. Understanding of online advertising, online fraud	
		2. Understanding phishing, online games	
		3. Use of Internet-shops, signs of reliability, consumer rights	
	BM 8. Compliance with safety regulations and labor protection	LO 1. To know basic concepts, techniques of first aid and emergency protection methods	
2. Master the fire and safety rules, rules of conduct, methods and means for the protection of people in an emergency (accident, catastrophe, disaster)			

		3. Recognition of major natural and technogenic hazards
LO 2. To follow the safety regulations, fire safety and security anti-terrorism requirements	1. Assessing the risk of hazards associated with violations of safety regulations, fire safety, requirements to ensure anti-terrorist protection and emergencies	
	2. To master requirements to ensure fire safety during maintenance of telecommunication networks.	
	3. Safety measures and precautions during maintenance of telecommunication networks.	
LO 3. To apply first aid techniques, methods of protection in emergencies	1. Formation and deepening of knowledge and understanding of the need to use first aid techniques, methods of protection in situations of danger for life in emergency situations in their professional activities	
	2. The consistent perception, evaluation, comparison and analysis of the information and use it for practical settlement of professional issues	
	3. Application of practical skills for	

		security in dangerous situations of everyday life and in emergency situations of different nature	
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Professional modules			
Module name	Learning outcomes (in accordance with the professional tasks)	Assessment criteria for learning outcomes	Disciplines that form the module
PM 1 Installation and configuration of the “Internet of things”	1. To plan the sequence of actions to install and configure “Internet of things” system components	1. The formulation of rules and principles of work system the “Internet of things” and M2M	1. Introduction to the “Internet of things” 2. Engineering graphics 3. Circuit Design 4. Microelectronics 5. Introduction to telecommunications systems
		2. Main system components the “Internet of things” and M2M	
	2. To recreate thumbnails of “Internet of things” and M2M systems	3. Planning the sequence of steps to install and configure the components of the “Internet of things” system	1. Radio equipment 2. M2M 3. Engineering and computer graphics
		1. Description of the standard components of the “Internet of things” and M2M;	
		2. Selection tools to customize the system according to the technological process;	
		3. Explanation of the principles of operation of the “Internet of things” and M2M;	

	3.To install “Internet of things” and M2M systems	<p>1. Correct selection of the components of the “Internet of things”</p> <p>2. The use of special tools to customize equipment in the correct sequence</p> <p>3. Using the necessary means to verify the correct installation and configuration of the system</p>	<p>Theory of electrical circuits</p> <p>Basics of electronic and measuring equipment</p> <p>Routing and switching</p> <p>Fundamentals</p>
PM 2. Installing and configuring software for M2M equipment	1. To define software for use in the “Internet of things” and M2M	<p>1. Choice of software components for the system “Internet of things” and M2M</p> <p>2. Selection criteria for software of the “Internet of things” and issuing recommendations.</p> <p>3. Definition of software for use in the “Internet of things” and M2M</p>	<p>1. Fundamentals of computer science and programming</p> <p>2. Overview of middleware</p>
	2. To perform the installation and modification of the software in accordance with the system architecture “Internet of things” and M2M systems	<p>1. Writing of Basic code in programming languages used in the “Internet of things” and M2M</p> <p>2. Software installation</p> <p>3. Validating the work of installed software</p>	<p>1. Software for the “Internet of things”</p> <p>2. Introduction to language Python</p> <p>3. Introduction to the language of C and C++</p> <p>4. Introduction to the languages Java and JavaScript</p>
	3.To customize M2M intercation	1. Selection with data exchange protocols for	1. Review of protocols of the

		<p>the “Internet of things” and M2M systems</p> <p>2. Configuration the exchange of data between devices</p> <p>3. Checking the quality of transmitted signals</p>	<p>Internet of things</p> <p>2. M2M interaction Technology</p>
PM 3. SIM card insertion to work in the M2M equipment	1. To describe the device of GSM network	<p>1. Listing of the components of GSM network</p> <p>2. Playing mobile network coverage maps</p> <p>3. Description of M2M technology through GSM network</p>	<p>1. Principle of construction of cellular networks</p> <p>2. Network and information transfer system</p> <p>3. Alarm GSM</p>
	2. To choose the type of SIM cards depending on the architecture of the “Internet of things”	<p>1. Enumeration of species and types of SIM cards</p> <p>2. Selection of appropriate SIM cards in accordance with the system architecture of the “Internet of things”</p> <p>3. Insert the SIM card</p>	<p>1. the operating principle of the SIM cards</p> <p>2. Structural scheme of GSM</p>
	3. To test work of SIM cards	<p>1. Knowing SIM card testing methodology</p> <p>2. Recovering information from SIM cards</p> <p>3. Checking the timeliness of sending and receiving information, provided the SIM card</p>	<p>1. Operating principle of the SIM cards</p> <p>2. Methods of recovering data from storage media</p>

PM 4. Implementation of service maintenance and repair of the Internet of Things platform and M2M	1. To ensure the operation of the Internet of Things platform and M2M	1. Description of the principles of the system components	1. Creating an enterprise service bus application 2. Practical course "Internet of Things" 3. Software update procedures 4. Installing and configuring computer systems software 5. Software and hardware components of the Internet of Things system 6. Maintenance of computer equipment and computer networks
		2. Application of methods, equipment and tools	
		3. Identification of troubles	
	2. To update specialized and middleware	1. Purpose of software licensing	
		2. Description of the procedure for carrying out a set of measures aimed at updating the software	
		3. Software Update	
	3. To update M2M equipment and other devices that are components of the Internet of Things platform	1. Determination of the technical condition of M2M equipment and other components of the Internet of Things system	
		2. Application of methods and tools	
		3. Upgrading M2M equipment and other devices that are components of the Internet of Things platform	
PM 5. Storage and transmission of data obtained	1. To transfer data obtained from sensor M2M in cloud systems	1. Identify ways of carrying and storing data in the cloud	1. Cloud computing 2. Architecture of cloud systems
		2. Allocation of time resources at the each stage of data transfer	

with M2M sensors		3. Transfer the data obtained from sensors in the M2M cloud	
	2. To configure the technology platform for the implementation of cloud-based systems	1. Job description of standard hardware and software platforms	1. Cloud computing 2. Communication protocols for cloud computing
		2. transfer the configuration steps cloud infrastructure	
3. setting up a technological platform			
3. To fill in the data in cloud services		1. Enumeration of types of cloud services for storing data	1. Cloud computing 2. Communication protocols for cloud computing 3. Technologies and cloud services
		2. Determining the amount of memory for storing data in the cloud services	
		3. Localization data in the cloud	
PM 6. Readout of indicators from equipment on the Internet of Things platform and M2M	1. To identify modern means of measuring and controlling M2M equipment	1. Classification of measuring instruments	1. Classification of measuring instruments 2. Accuracy class of measuring instruments 3. Digital and analogue M2M sensors
		2. Description of the principles of measurement of physical quantities	
		3. Definition of modern measuring instruments	

	2. To collect information obtained from M2M sensors	1. Listing methods for collecting data received from M2M sensors	4. Modern methods and means of data analysis 5. The main components of Microsoft office: Excel, Word, PowerPoint
		2. Distribution of information collected from M2M sensors by categories	
		3. Collection of cumulative files for the removed indicators	
	3. To create a report on indicators taken from M2M equipment	1. Characteristics of reporting forms	
		2. Entering data into the report form for M2M readings taken from sensors	
		3. Reporting	
PM 7. PM 7. Determination of the technical state of M2M equipment and the Internet of Things platform	1. To diagnose M2M equipment	1. Conducting visual and technical inspection	1. Software and hardware components of the "Internet of things"
		2. Determining the causes of malfunction of the system components	2. Maintenance of computers and computer networks
		3. Proposing measures to eliminate or minimize the risk of defects in system components	

<p>2. To understand the purpose of the SLA and follow the points prescribed in the SLA;</p>	<p>1. Explanation of the purpose of the SLA contract</p>	<p>1. IT Service Management 2. IT Service Level Management 3. Forming SLA</p>
	<p>2. Description of the boundaries of responsibility within the service for the Internet of Things and M2M systems</p>	
	<p>3. Formulation of the parameters of the services provided to monitor the proper operation and maintenance of components of the “Internet of Things” system</p>	
<p>3. To prepare documentation for the repair of M2M equipment, monitor the technical condition of equipment received from the repair;</p>	<p>1. Determination of the procedure for preparing documentation for the repair of components of the Internet of Things system</p>	<p>1. Software and hardware components of the Internet of Things system 2. Technical maintenance of computer equipment and computer networks</p>
	<p>2. Description of actions for checking equipment received from repair</p>	
	<p>3. Determination of the sequence of actions to test the condition of the equipment before repair and after repair</p>	

Specification of Basic Module BM 1

"Application of professional vocabulary, writing business papers in the field of professional activity"

Scope of competence	-
Name and code of the module	Application of professional vocabulary writing business papers in the field of professional activity
Purpose of the module	After studying this module, the student will be able to apply professional vocabulary in the field of professional activity.
Level of professional qualification	5
Learning Outcomes by Module	<ol style="list-style-type: none"> 1) To know the grammar and terminology of the Kazakh (Russian) and foreign languages for communication in the sphere of their professional activities. 2) To own a translation technique (with a dictionary) of professionally-oriented texts 3) To conduct professional dialogical speech in Kazakh (Russian) and foreign languages.
Summary of Content (sections, themes)	<ol style="list-style-type: none"> 1. Knowing of lexical and grammatical material in the specialty necessary for professional communication. 2. Understanding the value of written and oral communication in Kazakh (Russian) and foreign languages. 3. The use of communication skills to establish and develop relations of cooperation and partnership. 4. Writing texts using various presentation forms. 5. Reading and translating (with a dictionary) texts of professional orientation. 6. Independent compilation of coherent, logical reasoned statements in accordance with the proposed topic. 7. Understanding of the discussion topics and participation in its discussion. 8. Drawing up in Kazakh (Russian) and foreign languages a summary, autobiography, description, statement, complaint, power of attorney, receipt.

	9. Compliance with the basic requirements for the text of the document. 10. Creation of documents on the computer that meet modern requirements and established regulations.
Prerequisites	Knowledge of the school course of Kazakh, Russian, foreign language; Introduction to the specialty.
Modules forming the discipline	Professional Kazakh (Russian) language; Professional foreign language; Professionally-oriented foreign language; Office work in the state language.
Module type (mandatory, optional)	Mandatory
Labor intense (credits RK/academic hours)	4 credits /120 hours
Duration of the module	1-5 semester
Form of teaching	Full-time
Education technology	Modular
Teaching methods.	Verbal (conversation, lecture); visual practical; problem solving; reproductive; inductive; case study method.
Control Forms	Pass fail exam, exam
Required Resources	Personal Computer; software; presentations; electronic resources; support cards; handouts.
Language of instruction	Russian, Kazakh
Post-requisites	PM 1-PM 7

Specification for basic module 2.
“Development and improvement of physical qualities”

Scope of competence	
Title and code of the module	Develop and improve physical qualities.
Purpose of the module	After studying this module, the tutor will be able to Develop and improve physical qualities.
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To strengthen health and abide by the principles of a healthy lifestyle. 2. To improve physical qualities and psycho-physiological abilities. 3. To provide first medical aid in case of injuries and non-frequent cases.
A summary of the content (sections, themes)	<ol style="list-style-type: none"> 1. Understanding and adhering to the fundamentals and culture of a healthy lifestyle 2. Characterization of the physiological bases of the activity of the respiratory, circulatory and energy supply systems under muscle loads 3. Performing a set of exercises for general physical training. 4. Characteristics of the basics of physical activity and methods of its regulation 5. Selection and application of methods and means of physical culture to improve the basic physical qualities 6. Implementation of control standards and tests provided by the program. 7. Understanding the causes of injury during exercise eight. . The use of methods of injury prevention. 9. Providing medical care for injuries.
Prerequisites	Physical education
Disciplines forming the module	Physical education
Module type (mandatory, optional)	Mandatory
Labor intensity (credits / academic hours)	5 credits / 150 hours
Duration of the module	
Form of teaching	Full-time
Education technology	Modular

Form of organization of educational process.	Lecture, independent work, practical lessons
Teaching methods.	Oral interaction, testing, presentation, report, post, interviews, essays, creative task, colloquium. project work, case-study
Forms of control	Pass fail exam, exam
Required resources	Personal computer, software. Interactive board. TV. Audio-video equipment. Sports equipment, trainers and equipment. Library Fund. Kydyrmoldina A. Dene, turbis_ men sport tyrleriniń physiologyq negizderi: okulyk azastan Respublikasyny Bilim zhyne rylym ministerlili. Almaty 2014 Mұhamedzhanova Ұ. Dene shynuqtyru pәninen oqytu әdistemesi. Oқu kұrali. Astana. Folio. 2011 Dene shynuqtyru dayynduғyny ң presidenttik tetiler- Kazakstan Respubliki khalkyn saуqtyruduң negizi. Ідіstemelik oқu kұraly. Astana 2014 Zheleznyak Yu.D. Theory and methods of sports games. 2014 Lyakh, Zdanevich. Physical culture 10-11 grades 2012.
Language of instruction	Russian, Kazakh
Post-requisites	

Specification for basic module 3.
“Application of the foundations of social sciences for socialization and adaptation in society and the work place”

Scope of competence	
Title and code of the module	Application of the foundations of the social sciences for socialization and adaptation in society and the workforce.
Purpose of the module	After studying this module, the tutor will be able to apply the fundamentals of the social sciences for socialization and adaptation in society and at the work place.
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To know the basic concepts and information of philosophy, political science, cultural studies and sociology. 2. To understand the international political processes, the geopolitical situation and moral values and norms that form tolerance and an active personal position. 3. To know basic concepts and information about the main branches of law.
A summary of the content (sections, themes)	<ol style="list-style-type: none"> 1. Understanding the essence and essence of the concepts, categories and information of philosophy, political science, cultural studies and sociology. 2. Identification of problems and interrelations of the main categories and concepts of philosophy, political science, cultural studies and sociology 3. Analysis of various points of view. 4. Characteristics of the structure of the political system, history and the current state of world and traditional religions. 5. Definition of differences extremist, radical and terrorist ideologies. 6. Tolerant perception of social, ethnic, confessional and cultural differences. 7. Possession of the basic provisions of criminal, civil and family law and information about taxes.

	8. Understanding of responsibility for administrative and corruption offenses and observance of the principles of law and order. 9. Protecting your rights in accordance with labor laws.
Prerequisites	History of Kazakhstan
Disciplines forming the module	Basic philosophy Culturology The basis of the economy. Basis of law Fundamentals of sociology and political science
Module type (mandatory, optional)	Mandatory
Labor intensity (credits RK/ academic hours)	3 credits / 90 hours
Duration of the module	Semester
Form of teaching	Full-time
Education technology	Modular
Form of organization of educational process. Teaching methods.	Lecture, independent work, practical lessons Oral interaction, testing, presentation, report, post, interviews, essays, creative task, colloquium. project work, case-task
Forms of control	Pass fail exam
Required resources	Personal computer, software. Interactive board. Electronic textbook. Sybanbaev K.U. Philosophy. Almaty: Economy 2013 Kishibekov D Philosophy. Almaty: Karasai 2011 Razdykov S.Z. Basics of political science. Textbook. Astana: Folio 2012 Rakhimbaeva A.S. Basics of political science. Course of the lecture. A.Foliant 2012. E-book, Political Science: Summaries, Lectures, author: Mukhaev RT, Zaitsev AV M 2004. Karakuzova Zh.K. Culturology: A: Tome 2014 Kairbekov B.G. National customs and traditions. A: Empire.KZ.2012. Video: http://www.ata-mura.kz
Language of instruction	Russian, Kazakh
Post-requisites	

**Specification for basic module 4.
“Reading of drawings”**

Scope of competence	
Title and code of the module	BM 5 Reading drawings
Purpose of the module	After studying this module, the tutor will be able to read the drawings.
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To know the rules of design PKD. 2. To issue PKD in accordance with the main standards of ESKD. 3. To perform design on the plane.
A summary of the content (sections, themes)	<ol style="list-style-type: none"> 1. Basic concepts of basic technological drawing. 2. Understanding of a unified design documentation system. 3. Formulation of the rules of registration. 4. Determine the purpose of the scale of the implementation of drawing technical details 5. Possession of skills design PKD. 6. Execution of drawings in accordance with the main standards ESKD. 7. Reading assembly drawings and circuit diagrams. 8. Possession of design skills on the plane. 9. Execution of drawings with projection on the plane.
Prerequisites	
Disciplines forming the module	Technical drawing
Module type (mandatory, optional)	Mandatory
Labor intensity (credits / academic hours)	1 credits/30 hours
Duration of the module	Semester
Form of teaching	Full-time
Education technology	Modular
Form of organization of educational process. Teaching methods.	Lecture, independent work, practical lessons

	Oral interaction, testing, presentation, report, post, interviews, essays, creative task, colloquium. project work, case-task
Forms of control	Pass fail exam
Required resources	Personal computer, software. Interactive whiteboard. Electronic textbook. Bogolyubov SK "Drawing" Moscow 1989. Saparov V.E. Maksimov N.A. "System of standards in telecommunications and electronics" Moscow 1985. ESKD "Symbols conditional graphically in schemes" Moscow, 1985. State Standards Moscow, 1986 Volume 1,2,3. Baranov B.S. "Fundamentals of drawing" Moscow, 1985. Mironov RS Mironov B.G. "Collection of tasks for drawing" Moscow, 1984. Egorov S.A. "Drawing and Drawing" Moscow, 1985. Simonenko V.D. "Textbook for drawing 9 cl." Moscow, 2007. Kuprikov M..Y., Markhina L.P. "Line of CMB in drawing" ed. Drofa 2008 Yakovlev G.N. "Geometry" Moscow, 1987
Language of instruction	Russian, Kazakh
Post-requisites	

Specification of the Basic Module 5.
“Application of basic knowledge of economics in professional activities”

Scope of competence	
Title and code of the module	BM 6. Application of basic knowledge of economics in professional activities
Purpose of the module	After studying this module, the tutor will be able to apply the basic knowledge of the economy in professional activities.
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To determine the forms and types of property, types of plans, basic economic indicators of the enterprise. 2. To understand the development trends of the world economy, the main objectives of the state's transition to a green economy. 3. To determine the possibility of success and risk business.
A summary of the content (sections, themes)	<ol style="list-style-type: none"> 1. Understanding of the laws and principles of a market economy, tax policy, sources of inflation, the main stages and content of planning. 2. Performing of the necessary economic calculations using mathematical methods to determine the main economic indicators of the enterprise. 3. Determination of the main economic indicators of the enterprise. 4. Characteristics of trends in the global economy. 5. Understanding the main objectives of the transition of the state to a "green" economy. 6. Application of the main methods of calculating gross domestic product and gross national product for the state's transition to a green economy. 7. Characteristics of goals, factors, conditions, organizational and legal forms of entrepreneurial activity. 8. Understanding the factors that determine the success of business activities. 9. Drawing up a business plan

Prerequisites	Basics of Economics
Disciplines forming the module	Economics of communication enterprises and fundamentals of entrepreneurial activity.
Module type (mandatory, optional)	Mandatory
Labor intensity (credits / academic hours)	1 credit / 30 hours
Duration of the module	Semester
Form of teaching	Full-time
Education technology	Modular
Form of organization of educational process. Teaching methods.	Lecture, independent work, practical lessons Oral interaction, testing, presentation, report, post, interviews, essays, creative task, colloquium, project work, case study
Forms control	Pass fail exam, exam
Required resources	Personal computer, software. Interactive whiteboard. Electronic textbook. Gabit J.H.H. Microeconomics- Astana, Foliant, 2012. Bekmoldin S.K. Economic Theory-Astana, Foliant, 2012. Chayzhunusova G.ZH. Basics of Economics. Astana, Foliant 2011. Shulenbaeva S. Workshop on the basics of a market economy, Foliant, 2011. Khamitova G. Economics and fundamentals of entrepreneurship, Foliant, 2011. Bekbolsynova A. Taxes and taxation, Foliant, 2014. Nurpeys E. Basics of Macroeconomics, Foliant, 2011. Khojaniyazov Zh. T. Basics of a Market Economy, Foliant, 2011
Language of instruction	Russian, Kazakh
Post-requisites	

Specification of the Basic Module 6.
“Understanding the history, role and place of Kazakhstan in the world community”

Scope of competence	
Title and code of the module	Understanding of the history, role and place of Kazakhstan in the world community.
Purpose of the module	After studying this module, the tutor will be able to Understand the history, role and place of Kazakhstan in the world community.
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. Name the main historical events. 2. Establish causal relationships of historical events. 3. Assess the achievements of independent Kazakhstan.
A summary of the content (sections, themes)	<ol style="list-style-type: none"> 1. Understanding the essence of historical events that took place from antiquity to the present 2. Disclosure of the role and place of the Kazakh people in the common Turkic community, in the system of the nomadic civilization, in the development of the historical and cultural community of the peoples of the Eurasian world. 3. Compiling a chronology of major historical events 4. Understanding the facts, processes and phenomena of historical events 5. Determination of the main facts, processes and phenomena that reflect and characterize the integrity and consistency of the history of Kazakhstan 6. Establishing causal relationships of historical events 7. Understanding the nature and purpose of the political and social changes taking place in the Republic of Kazakhstan after independence. 8. Characteristics of the achievements of independent Kazakhstan. 9. Evaluation of the achievements of independent Kazakhstan.

Prerequisites	History of Kazakhstan
Disciplines forming the module	History of Kazakhstan
Module type (mandatory, optional)	Mandatory
Labor intensity (credits / academic hours)	2 credits / 60 hours
Duration of the module	Semester
Form of teaching	Full-time
Education technology	Modular
Form of organization of educational process. Teaching methods.	Lecture, independent work, practical lessons Oral interaction, testing, presentation, report, post, interviews, essays, creative task, Colloquium. project work, case-task
Forms of control	Pass fail exam, exam,
Required resources	Personal computer, software. Interactive whiteboard. Electronic textbook. Z.O. Artykbaev 12 lectures on the history of Kazakhstan. Folio 2013. Zholdasbayev S. History of Kazakhstan of the Middle Ages. Textbook, 2nd ed., Revised- Almaty: Atamura 2012 Turmanova B.K. Bermanova S.T. History of Kazakhstan. Tutorial. A: Folio 2013. Kasymbaev Zh.K. History of Kazakhstan (XVIIIv-1914) Textbook. Almaty: Mektep, 2012. Kabuldinov Z.E., Kayipbaeva A.T. History of Kazakhstan (XVIIIv-1914) Textbook for grade 8 of secondary school. 2nd ed., Pererab. Almaty: Atamura, 2012. R. Sausenova. History of Kazakhstan. Almaty: Mektep, 2011. Igibaev S. History of Kazakhstan in sources and materials. Astana: Foliant 2013.
Language of instruction	Russian, Kazakh
Post-requisites	Culturology, Fundamentals of Sociology and Political Science.

Specification of the basic module 7
“Application of digital devices and microprocessor systems in communication technology”

Scope of competence	
Title and code of the module	Application of digital devices and microprocessor systems in communication technology.
Purpose of the module	After studying this module, the tutor will be able to use digital devices and microprocessor systems in communication technology.
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To determine the principle of construction and operation of digital devices and microprocessor systems. 2. To distinguish the principle of operation of a typical microprocessor and microcontroller. 3. To synthesize combinational and sequential digital.
A summary of the content (sections, themes)	<ol style="list-style-type: none"> 1. Understanding the basics of universal software packages 2. Implementation of computer simulation of digital devices using programs 3. The formulation of logical elements and functions in different standards 4. The definition of the principle of operation of the structure, the main combinational digital devices 5. Possession of technical characteristics, design features and purpose of electrical equipment 6. Assembly of semiconductor diodes and other electronics elements, separate blocks of digital devices 7. Determination of the possibility of microprocessor tools in solving problems of controlling the operation of station equipment of electronic exchanges of various systems. 8. The use of information technology in solving production problems. 9. Implementation of special computer programs for working with external devices of electronic PBX.
Prerequisites	Basics of Informatics, Physics, Chemistry, Mathematics.

Disciplines forming the module	Computer science. Digital devices and microprocessor systems.
Module type (mandatory, optional)	Mandatory
Labor intensity (credits / academic hours)	1 credits / 30 hours
Duration of the module	semester
Form of teaching	Full-time
Education technology	Modular
Form of organization of educational process. Teaching methods.	Pass fail exam, exam
Forms of control	Pass fail exam
Required resources	Personal computer, software. Interactive whiteboard. Electronic textbook. Computer programs. Goldenberg L.M. and others. Digital devices and microprocessor systems. Tasks and exercises: Proc. manual for universities. L.M. Goldenberg, V.A. Malev, G.B. Malko- M: Radio and Communication, 1992. Kalabekov BA Digital devices and microprocessor systems. M: Hotline-Telecom, 2000. O.N. Lebedev. Memory chips and their application.-M: Radio and communication, 1990. Logic IC KR1533, KR15554: Reference book / Petrovsky I.I., Pribylsky AV, Troyan AA, Chuvelev V.S.- M: TOO " BINOM ", 1993. Opadchiy Yu.F., Gludkin OP, Gurov A.I. Analog and digital electronics.- M: Hot Line-Telecom, 1999. Ugryumov E.P. Digital circuit technology.- SPb: BHV- St. Petersburg, 2000. Usatenko S.T., Kachenyuk TK, Terekhova N.V. Execution of electrical circuits for ESKD.-M: Publishing house of standards, 1989. Nsanov MA Digital devices and microprocessor systems. Astana: Foliant, 2010.
Language of instruction	Russian, Kazakh
Post-requisites	Digital and fiber optic transmission systems, Digital switching systems, Communication networks and switching systems.

Specification of the basic module 8
“Compliance with safety regulations and labor protection”

Scope of competence	
Title and code of the module	Compliance with safety regulations and labor protection.
Purpose of the module	After studying this module, the trainee will be able to follow the rules of safety and labor protection.
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To comply with the principle of priority of preserving human health and safety during the labor process. 2. To comply with safety regulations, electrical safety and fire safety. 3. To apply first aid techniques, methods of protection in emergencies.
A summary of the content (sections, themes)	<ol style="list-style-type: none"> 1. Legal regulations in the field of occupational safety and health. 2. Ensuring the safety of the workplace. 3. Compliance with the requirements of industrial sanitation. 4. Assessment of the risk of hazards associated with violations of safety regulations, electrical safety and fire safety. 5. Provision of materials, equipment, equipment and fire extinguishing equipment when servicing telecommunications networks. 6.. Compliance with safety precautions and precautions when performing maintenance of telecommunications networks. 7. Consistent perception, evaluation, comparison and analysis of information and its use for the practical solution of professional tasks 8. Demonstration of first-aid techniques, methods of protection in the face of danger to life in emergency situations in their professional activities. 9. The use of practical skills to ensure safety in dangerous situations of everyday life and in emergency situations of different nature
Prerequisites	Physics, chemistry .

Disciplines forming the module	Occupational Safety and prevention of accidents. Production training. Professional practice.
Module type (mandatory, optional)	Mandatory
Labor intensity (credits / academic hours)	1 credits / 30 hours
Duration of the module	semester
Form of teaching	Full-time
Education technology	Modular
Form of organization of educational process. Teaching methods.	Lecture, independent work, practical. Oral interaction, testing, presentation, report, post, interviews, essays, creative task, Colloquium. project work, case-task
Forms of control	Pass fail exam
Necessary resources	Personal computer, software. Interactive whiteboard. Electronic textbook. Kukin P.P., Lapin V.L., Ponomarev N.L., Serdyuk N.I. Life Safety. Safety of technological processes and production (OT). M: Graduate School 2002. Baklashov N.I., Kitaeva N.ZH., Terekhov B.D. Labor protection at communication enterprises and environmental protection.- M: Radio and communication. 1989 Labor protection in electrical installations. Under. ed. B.A. Knyazevsky. M: 1981 TB rules when working on the wired broadcast stations.
Language of instruction	Russian, Kazakh
Post-requisites	Technological practice, pre-diploma practice.

Specification of Professional module 1
“Installation and configuration of the “Internet of things” system components

Scope of competence	Installation and configuration of the “Internet of things” system components
Name and code of the module	Installation and configuration of the “Internet of things” system components
The purpose of the module	After studying this module, the trainee will be able to install and configure the components of the “Internet of things” system
Level of professional qualification	4
Training outcomes by module	1. To plan the sequence of actions to install and configure system components “Internet of things” TO 2. To recreate thumbnails “Internet of things” and M2M TO 3.To install systems “Internet of things” and M2M
Summary of content (sections, themes)	1. Formulation of the rules and principles of the Internet of Things and M2M 2. Appointment of the main components of the Internet of Things system and M2M 3. Drawing up a sequence plan for installing and configuring the components of the Internet of Things system 4. Description of the standard components of the Internet of Things system and M2M; 5. Selection of tools for setting up the system according to the technological process; 6. Explanation of the principles of the Internet of Things system and M2M; 7. Correct selection of components of the Internet of Things system 8. Using of special tools to adjust the equipment in the desired sequence. 9. Using the necessary tools to verify the installation and configuration of the system.
Prerequisites	Physics; Mathematics; Engineering graphics; Theoretical bases of electrical engineering.
Discipline that form the module	1. Circuit technology 2. Telecommunication networks 3. “Internet of things” system 4. Engineering graphics

	5. Microelectronics 6. Radio engineering
Module type (mandatory, optional)	Mandatory
Labor Intensity (credit / academic hours)	9 credits / 270 hours
The duration of the module	3 semester
Form of Training	Full-time
Education technology	Modular
The form of organization of educational process. Teaching methods.	Lecture, independent work, practical.
Forms of control	Pass fail exam, exam
Required resources	Personal computer software: Microsoft Windows, Microsoft office Teaching-training materials: Samuel Greengard “Internet of things. The future is here already”. A.V. Roslyakov, S.V. Vanyashin, A.Yu. Grebeshkov, M.Yu. Samsonov “Internet of things”. S. Milenina “Electrical engineering, electronics and circuit engineering”.
Language of Training	Russian, Kazakh
Post-requisites	Installing and configuring software for M2M equipment Installing the SIM card to work in the M2M equipment Reading of meters from equipment on the “Internet of things” and M2M platform Storage and transmission of data obtained with M2M sensors Implementation of the service and repair of the platform “Internet of things” and M2M Definition of the technical condition of the equipment and the “Internet of things” and M2M platform

Specification of Professional module 2
“Installation and configuration of the software for the operation of the M2M equipment”

Scope of competence	Installation and configuration of the “Internet of things” system components
Name and code of the module	Installing and configuring the software for the operation of the M2M equipment
Purpose of the module	After studying this module, the trainee will be able to install and configure the software for the operation of the M2M equipment.
Level of professional qualification	4
Training outcomes by module	<ol style="list-style-type: none"> 1. Define system software "Internet of things" and M2M 2. To perform the installation and modification of the software in accordance with the system architecture "Internet of things" and M2M 3. Configure machine to machine interaction
Summary of content (sections, themes)	<ol style="list-style-type: none"> 1. Select software components for the system "Internet of things" and M2M 2. Selection criteria for software of the "Internet of things" and issuing recommendations. 3. Definition of software for use in the "Internet of things" and M2M 4. Writing of basic code in programming languages used in the "Internet of things" and M2M 5. Install the software 6. Validation of the installed software 7. Selecting the system with data exchange protocols "Internet of things" and M2M 8. Configuring the exchange of data between devices 9. Check the quality of transmitted signals
Prerequisites	
Disciplines that form the module	<ol style="list-style-type: none"> 1. Computer Science 2. Programming 3. Software and protocols of data transfer for the “Internet of things” 4. M2M interaction Technology

Module type (mandatory, optional)	Mandatory
Labor Intensity (credit / academic hours)	8 credits / 240 hours
Duration of the module	3 semester
Form of Training	Full-time
Education technology	Modular
Form of organization of educational process. Teaching methods.	Lecture, independent work, practical classes.
Forms of control	Pass fail exam, exam
Required resources	<p>Personal computer software: Personal computer software: Microsoft Windows, Microsoft office, R , Python</p> <p>Teaching-training materials: Mark Lutz: programming in Python. S. Zadadaev – Mathematics in the R language Ye.V. Meheyeva, O.I. Titov Information science A.V. Roslyakov, S.V.Vanjashin, A.Yu. Grebeshkov, M.Yu. Samsonov M. “Internet of things”.</p>
Language of instruction	Russian, Kazakh
Post-requisites	<p>Install and configure the ““Internet of things”” components</p> <p>Installing the SIM card to work in the M2M equipment</p> <p>Reading of meters from equipment on the platform of “Internet of things” and M2M</p> <p>Storage and transmission of data obtained with M2M sensors</p> <p>Implementation of the service and repair of the platform “Internet of things” and M2M</p> <p>Definition of the technical condition of the equipment and the “Internet of things” and M2M platform</p>

Specification of Professional module 3
“SIM card insertion to work in the M2M equipment”

Scope of competence	Installation and configuration of the “Internet of things” system components
Name and code of the module	SIM card insertion to work in the M2M equipment
Purpose of the module	After studying this module the trainee will be able to choose and install normal or Thermo SIM maps
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. Describe the device of GSM network 2. Determine the types of SIM cards 3. Test SIM card
Summary of content (sections, themes)	<ol style="list-style-type: none"> 1. The listing of components of GSM network 2. Play mobile network coverage maps 3. Description of M2M technology through GSM network 4. Enumeration of species and types of SIM cards 5. Select the appropriate SIM cards in accordance with the system architecture of the "Internet of things" 6. SIM card installation 7. Holdings of testing methodology SIM cards 8. Recovering information from SIM cards 9. Checking the timeliness of sending and receiving information, provided SIM card
Prerequisites	
Discipline that form the module	<ol style="list-style-type: none"> 1. Telecommunication system 2. “Internet of things”
Module type (mandatory, optional)	Mandatory
Labor Intensity (credit RoK/ academic hours)	6 credits / 180 hours
The duration of the module	3 semester
Form of Training	Full-time
Education technology	Modular
The form of organization of educational process.	Lecture, independent work, practical classes.

Teaching methods.	
Forms of control	Pass fail exam, exam
Required resources	<p>Personal computer software: Microsoft Windows, Microsoft office</p> <p>Teaching-training materials: V. Kruhmalev, B. Gordienko, A. Mochenov: “Fundamentals of telecommunication systems and networks”.</p> <p>A.V.Roslyakov, S.V. Vanyashin, A.Yu. Grebeshkov, M.Yu. Samsonov “Internet of things”.</p>
Language of instruction	Russian, Kazakh
Post-requisites	<p>Install and configure the “Internet of things” components</p> <p>Installing the SIM card to work in the M2M equipment</p> <p>Reading of meters from equipment on the “Internet of things” and M2M platform</p> <p>Storage and transmission of data obtained with M2m sensors</p> <p>Implementation of the service and repair of the platform “Internet of things” and M2M</p> <p>Definition of the technical condition of the equipment and the “Internet of things” and M2M platform</p>

Specification of Professional module 4
“Implementation of service maintenance and repair of the platform “Internet of Things” and M2M”

Scope of competence	Service maintenance of the Internet of Things system.
Title and code of the module	Implementation of service maintenance and repair of the Internet of Things platform and M2M
Purpose of the module	After studying this module, the student will be able to perform maintenance and repair of the Internet of Things platform and M2M
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To provide operation of the Internet of Things and M2M platform 2. To update specialized and middleware 3. To update M2M equipment and other devices that are components of the Internet of Things platform
Summary of content (sections, themes)	<ol style="list-style-type: none"> 1. Description of the principles of the system components 2. Application of methods, equipment and tools 3. Identification of troubles 4. Purpose of software licensing 5. Description of the procedure for carrying out a set of measures aimed at updating the software 6. Software update 7. Determination of the technical condition of M2M equipment and other components of the Internet of Things system 8. Application of methods and tools 9. Upgrading M2M equipment and other devices that are components of the Internet of Things platform
Prerequisites	
Discipline that form the module	<ol style="list-style-type: none"> 1. Measuring tools 2. Components of the "Internet of things" 3. Data analysis 4. Data Visualization 5. Applications of Microsoft office

Module type (mandatory, optional)	Mandatory
Labor Intensity (credit RK/ academic hours)	7 credits / 210 hours
The duration of the module	3 semesters
Form of Training	Full-time
Education technology	Modular
The form of organization of educational process. Teaching methods.	Lecture, independent work, practical classes.
Forms of control	Pass fail exam, exam
Required resources	<p>Personal computer, software: Microsoft Windows, Microsoft office.</p> <p>Educational materials: A.V.Roslyakov, S.V. Vanyashin, A.Yu. Grebeshkov, M.Yu. Samsonov "Internet of Things". S.A. Bogomolov "Fundamentals of electronics and digital circuitry". Yu.A. Ovechkin "Microelectronics". S.I. Baskakov "Radio circuits and signals." A. Guseva, V. Kireev. "Computing Systems, Networks and Telecommunications".</p>
Language of Training	Russian, Kazakh
Post-requisites	<p>Installing and configuring the "Internet of things" components</p> <p>Installing the SIM card to work in the M2M equipment</p> <p>Reading of meters from equipment on the platform of "Internet of things" and M2M</p> <p>Storage and transmission of data obtained with M2m sensors</p> <p>Implementation of the service and repair of the platform "Internet of things" and M2M</p> <p>Definition of the technical condition of the equipment and the "Internet of things" and M2M platform</p>

Specification of Professional module 5
“Storage and transmission of data obtained from sensors M2M”

Scope of competence	Localization and data transfer obtained from M2M sensors.
Name and code of the module	Storage and transmission of data obtained from sensors M2M
Purpose of the module	After studying this module, the trainee will be able to store and transmit data obtained from sensors M2M
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To transmit data from sensors in the M2M cloud 2. To customize technological platform for the implementation of cloud-based systems 3. To localize the data in cloud services
Summary of content (sections, themes)	<ol style="list-style-type: none"> 1. Identify ways of carrying and storing data in the cloud 2. Allocation of time resources at the each stage of data transfer 3. Data transfer obtained from sensors in the M2M cloud 4. Functional description of standard hardware and software platforms 5. Enumeration of the configuration steps cloud infrastructure 6. Setting up a technological platform 7. Enumeration of types of cloud services for storing data 8. Determination of the required amount of memory for storing data in the cloud services 9. Localization data in the cloud
Prerequisites	
Disciplines that form the module	<ol style="list-style-type: none"> 1. Measuring tools 2. Components of the "Internet of things" 3. Data analysis 4. Data Visualization 5. Applications of Microsoft office
Module type (mandatory, optional)	Mandatory

Labor Intensity (credit / academic hours)	10 credits / 300 hours
The duration of the module	3 semester
Form of Training	Full-time
Education technology	Modular
The form of organization of educational process. Teaching methods.	Lecture, independent work, practical classes.
Forms of control	Pass fail exam, exam
Required resources	<p>Personal computer software: Microsoft Windows, Microsoft office</p> <p>Teaching-training materials: Yu.A. Semyonov: "Algorithms for telecommunication networks. 3 parts. Part 1. Algorithms and protocols of data transfer channels and networks." A.V.Roslyakov, S.V. Vanyashin, A.Yu. Grebeshkov, M.Yu. Samsonov "Internet of things". George Reese: "Cloud computing". D.N. Monakhov, N.V. Monakhov, G.B. Pronchev, D.A. Kuzmenkov: "Cloud technologies. Theory and practice"</p>
Language of Training	Russian, Kazakh
Post-requisites	<p>Installing and configuring software for M2M equipment</p> <p>Installing the SIM card to work in the M2M equipment</p> <p>Reading of meters from equipment on the "Internet of things" and M2M platform</p> <p>Implementation of the service and repair of the platform "Internet of things" and M2M</p> <p>Definition of the technical condition of the equipment and the "Internet of things" and M2M platform</p>

Specification of Professional module 6
“Metering of indicators from equipment on the Internet of Things and M2M platform”

Scope of competence	Analysis of data obtained from the devices of the system “Internet and things” and M2M.
Name and code of the module	Metering of indicators from equipment on the Internet of Things platform and M2M
Purpose of the module	After studying this module, the student will be able to remove indicators from equipment on the Internet of Things platform and M2M
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To determine modern means of measuring and controlling equipment M2M 2. To collect information obtained from M2M sensors 3. To prepare a report on the indicators taken from M2M equipment
Summary of content (sections, themes)	<ol style="list-style-type: none"> 1. Classification of measuring instruments 2. Description of the principles of measurement of physical quantities 3. Definition of modern measuring instruments 4. Listing methods for collecting data from M2M sensors 5. Distribution of information collected from M2M sensors by categories 6. Collection of cumulative files for the removed indicators 7. Characteristics of reporting forms 8. Entering data into the report form for M2M readings taken from sensors 9. Reporting
Prerequisites	
Disciplines that form the module	<ol style="list-style-type: none"> 1. Measuring tools 2. Components of the "Internet of things" 3. Data analysis 4. Data Visualization 5. Applications Microsoft office
Module type (mandatory, optional)	Mandatory
Labor Intensity (credit RoK/ academic hours)	5 credits / 150 hours
The duration of the module	3 semesters

Form of Training	Full-time
Education technology	Modular
The form of organization of educational process. Teaching methods.	Lecture, independent work, practical classes.
Forms of control	Pass fail exam, exam
Required resources	<p>Personal computer, software: Microsoft Windows, Microsoft office</p> <p>Educational materials: V. Yu. Shishmarev: "Measuring Instruments" A.S.Volegov, D.S.Neznakhin, E.A .Stepanova: "Metrology and measuring equipment. Electronic means of measuring electrical quantities. M.Yu.Arkipova, V.P.Sirotn, V.S. Mkhitaryan, T.A. Dubrova, Yu.A. Mironkina: "Data Analysis". S.E. Mastitsky: "Static analysis and data visualization using R".</p>
Language of Training	Russian, Kazakh
Post-requisites	<p>Installing and configuring software for M2M equipment SIM card insert to work in the M2M equipment Reading of meters from equipment on the "Internet of things" and M2M platform Definition of the technical condition of the equipment and the "Internet of things" and M2M platform</p>

Specification of Professional module 7
“Identification of technical condition of the M2M equipment and the
“Internet of things” platform”

Scope of competence	Carrying out maintenance of the "Internet of things".
Title and code of the module	Technical condition identification of the M2M equipment and the “Internet of things” platform
Purpose of the module	After studying this module, the trainee will be able to determine the technical condition of the M2M hardware and platform "Internet of things"
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To diagnose M2M equipment 2. To understand the purpose of the SLA and follow the points prescribed in the SLA; 3. To prepare documentation for the repair of equipment M2M, monitor the technical condition of the equipment received from the repair;
Summary of content (sections, themes)	<ol style="list-style-type: none"> 1. Conduct a visual and technical inspection 2. Determine the cause of a malfunction of the system components 3. Propose measures to eliminate or minimize the risks of defects of system components 4. Explanation of the purpose of the contract SLA 5. Description of the boundaries of responsibility within the systems service "Internet of things" and M2M 6. Formulating options of provided services to control the proper maintenance and repair of the components of the "Internet of things" 7. Determination of the order of documentation on repair of components of the "Internet of things" 8. Description of the work to verify repair of equipment 9. Determination of courses of action to test the condition of the equipment before and after repair
Prerequisites	

Discipline that form the module	<ol style="list-style-type: none"> 1. Measuring tools 2. Components of the "Internet of things" 3. Data analysis 4. Data Visualization 5. Applications of Microsoft office
Module type (mandatory, optional)	Mandatory
Labor Intensity (credit / academic hours)	8 credits/240 hours
Duration of the module	3 semester
Form of Training	Full-time
Education technology	Modular
Form of organization of educational process. Teaching methods.	Lecture, independent work, practical classes.
Forms of control	Pass fail exam, exam
Required resources	<p>Personal computer software: Microsoft Windows, Microsoft office.</p> <p>Teaching-training materials: A.V.Roslyakov, S.V. Vanyashin, A.Yu. Grebeshkov, M.Yu. Samsonov "Internet of things". S.A. Bogomolov "Fundamentals of electronics and digital circuit engineering". Yu.A. Ovechkin "Microelectronics". S.I. Baskakov "Radio circuits and signals". A. Gusseva, V. Kireyev "Computing systems, networks and telecommunications".</p>
Language of instruction	Russian, Kazakh
Post-requisites	<p>Installing and configuring software for M2M equipment</p> <p>Installing the SIM card to work in the M2M equipment</p> <p>Reading of meters from the equipment on the "Internet of things" and M2M platform</p> <p>Storage and transmission of data obtained with M2M sensors</p> <p>Implementation of the service and repair of the "Internet of things" and M2M platform</p>

EDUCATIONAL PROCESS PLAN

Code and the education profile: 1300000 – communications, telecommunications and information technology Specialty:
 1306000 – Radio Engineering and communications (by types)
 Qualification: 1306153 – Systems technician M2M and the “Internet of things”

Form of training: Full-time
 Standard term of training 2 years 10 months
 on the basis of general secondary education

Module Code	The name cycles disciplines/modules, practices	Credit	Exam	Differential testing	The amount of training time (hours)					Distribution of semester
					TOTAL	From them:				
						Theoretical training	Practical training*	Industrial training	Individual training	
GED	General Education Discipline	48			1448	1448				1-2
BM	Basic modules	18			540	240	-	270	30	3-6
BM 1	The use of professional vocabulary, the preparation of business papers in the field of professional activity	4	+	+	120	30	-	60	30	2-6
BM 2	Develop and improve physical qualities	5	+	+	150	-	-	150	-	2-6
BM 3	Application of the foundations of social sciences for socialization and adaptation in society and the workforce	3		+	90	90	-	-	-	3-4
BM 4	Reading drawings	1		+	30	-	-	30	-	3-4

BM 5	Application of basic knowledge of economics in professional activities	1		+	30	30	-	-	-	3-6
BM 6	Understanding the history, role and place of Kazakhstan in the world community	2	+	+	60	60	-	-	-	3-4
BM 7	The use of digital devices and microprocessor systems in communication technology	1		+	30	-	-	30	-	3-6
BM 8	Compliance with safety regulations and labor protection	1		+	30	30	-		-	5-6
PM	Professional modules on working qualifications (including industrial training and professional practice)	30	+	+	900	270	390	150	90	1-6
PM 1	Installing and configuring of Internet of Things components	9	+	+	270	90	120	60	-	1-4
PM 2	Installing and configuring software for M2M equipments	8	+	+	240	60	120	30	30	3-4
PM 3	Installing SIM cards for use in M2M equipment	6	+	+	180	60	60	30	30	3-5
PM 4	Implementation of service maintenance and repair of the Internet of Things platform and M2M	7	+	+	210	60	90	30	30	3-5
PM	Professional modules for mid-level specialist qualifications (including in-service training and professional practice)	24	+	+	720	180	270	180	90	3-6
PM 5	Removal of indicators from equipment on the Internet of Things platform and M2M	10	+	+	300	90	90	90	30	3-6
PM 6	Storage and transmission of data received from M2M sensors	5	+	+	150	30	60	30	30	3-6
PM 7	Determination of the technical condition of M2M equipment and the Internet of Things platform	8	+	+	240	90	60	60	30	3-6
	Subtotal:	120			3608	2138	660	600	210	
PP	Pre-diploma practice	8			240		240			6
GP	Graduation project	6			180	120			60	6
IC	Intermediate certification	8			240	240				1-6

FC	Final certification	2		60	60				6
	Total compulsory education	144		4328	2558	900	600	270	
C	Consultation	11		332	332				1-6
O	Optional classes	10		300	300				16
	Total:	165		4960	3190	900	600	270	

* Forms of control (number of coursework, examinations), study subjects (semester distribution) are approximate and may vary depending on the forms of training, the specificities of local specialties and other circumstances in accordance with the needs of employers.

* In accordance with GCEA, TVE educational institutions can modify up to 50% of the training time for mastering training material for modules, up to 50% on each module and up to 60% (up to 80% with dual training) of training and professional practice with preserving the total hours on compulsory education.