

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

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

**EDUCATION PROGRAM
by specialty**

0920000-Low-Voltage Networks
(code and name of the specialty)

Professional Qualification Level: mid-level specialist

Duration of training: 3 years 10 months.

Astana, 2018

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INTRODUCTION

This education program on specialty 0920000 – “Low-Voltage Networks” is developed in accordance with State compulsory education standard for technical and vocational education, approved by the Government Decree of the Republic of Kazakhstan dated August 23, 2012, No. 1080; National qualifications framework approved by the Protocol on March 16, 2016 by the Republican Tripartite Commission on social partnership and the regulation of social and labor relations, industry frame of qualifications in the field of “Power industry” approved by the order of the Deputy Prime Minister of the Republic of Kazakhstan of the Minister of industry and new technologies of the Republic of Kazakhstan dated December 19, 2013 No. 419; Professional standards: “Electricity supply (by branches)” and “Technical operation, maintenance and repair of electrical and electromechanical equipment (by types)” that define the training content and subject to the order of the Minister of education and science of the Republic of Kazakhstan dated October 31, 2017 No. 553 “On approval of model curricula and model academic plans on specialties in technical and vocational education”.

Legislative and normative acts of the Republic of Kazakhstan, domestic and foreign scientific and methodical work in this area, materials on the State of the economy, labor market and vocational education Kazakhstan are used at the development of the EP.

The program is designed to implement the principles of democratic administration of education, to expand 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 of 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 a modular-competence approach based on the development of competency assessment of students from the educational institutions in the form of basic educational results, use of a module training.

The program, based on competencies, is in line with the concept of training and training throughout life, as is aimed at generating highly qualified specialists, who are able to adapt to the changing situation in the world of work, on the one hand, and continue professional growth and education. This approach to training allows you to create a feeling of success of each student, which is created by the educational process organization in which the student (trainee) can and should control its own studies that train him to take responsibility for their own training, and further-for his/her own professional growth and career. Thus, the user will be satisfied with the education, he can improve it during life, responding to changes in the labor market.

Practice has shown that the future specialists must necessarily pass all levels of vocational training, namely, increased qualification level and middle level, i.e. only after the actual mastering of two or three qualifications one can become a trained technician.

In accordance with this education program, the training process in organizations of technical and vocational education is based on both the modular system and the credit system of teaching.

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

1. LIST OF SYMBOLS AND ABBREVIATIONS

BC	Basic competence
BM	Basic module
SCES	The State compulsory education standard
GD	Graduation design
FC	Final certification
C	Consultation
AC	Assessment Criteria
NQF	National Qualifications framework
GCEA	General classifier of types of economic activity
EP	Educational program
GED	General Education Discipline
SQF	Sectorial Qualifications framework
IC	Intermediate certification
PS	Professional standard
PC	Professional competence
PM	Professional module
RK	The Republic of Kazakhstan
LO	Learning Outcomes
TVE	Technical and vocational education

2. PASSPORT OF THE WORKING EDUCATION PROGRAM

Name (*specialty code and name*): 0920000 – “Low Voltage Network”

Name and code: 092001 3 - “Technician-electrician”

The purpose of the education program: training of qualified professionals that perform the operation, installation, adjustment and repair of electrical equipment of enterprises, improvement and modernization of the available equipment

Level of education: technical and vocational

Professional qualification: Middle-level Specialist

Skill levels on NQF/SQF: 4

Professional activity Area *: Energy

Type (s) of employment (*SQF and PS*):**

1. Metalwork machining of parts of electrical and electromechanical equipment
2. Technical and maintenance of elements in electrical and electromechanical equipment
3. Implementation of relocation, demolition and installation of elements in electrical and electromechanical equipment
4. Organization and production of works on electrical equipment maintenance
5. Compliance with the safety and labor protection requirements
6. Organization and control of the work to ensure the smooth operation of electrical equipment, machinery, vehicles and engines
7. Study of reliability parameters of power supply systems

Object(s) of professional activity (*by NCO, the initial group*)*:** electric power systems; electric power stations and complexes based on the non-traditional and renewable energy sources; energy companies, factories, equipment repair areas; electricity network company

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

Form of training: full-time

Training term: 3 years 10 months.

Language of instruction: State (Kazakh) and Russian

The volume of credits/hours: 219 credits / 6588 h.

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

COMPETENCY PROFILE

<p>Purpose of the training: the execution of the operation, installation, adjustment and repair of electrical equipment of enterprises, improvement and modernization of available equipment.</p>	<p>After the successful completion of the program, the trainee will be able to perform the operation, installation, adjustment and repair of electrical equipment of enterprises, improvement and modernization of available equipment.</p>	
<p>Section names, section, group, class and subclass according to GCEA* (<i>by PS</i>)</p>	<p>Section D : Electricity supply, gas, steam supply and air conditioning Section [35] : Electricity supply, gas, steam supply and air conditioning Group [351] : Production, transmission and distribution of electricity: Class 35 [12] : Transmission of electricity</p>	
<p>Scope of competences (<i>on core labor functions of professional standard or analysis profession</i>)**</p>	<ol style="list-style-type: none"> 1. Bench work of parts of electrical and electromechanical equipment 2. Technical and operational maintenance of electrical and electromechanical equipment 3. Works performance on moving, dismantling and installation of elements of electric and electromechanical equipment 4. Organization and performance of works on maintenance of electrical equipment 5. Meeting the requirements of safety and labour protection 	
<p>General (Basic) competencies</p>		
<p>Competence Code</p>	<p>Competence (in line with labor functions and skill levels)</p>	<p>Modules</p>
<p>Basic Competence</p>		
<p>BC 1</p>	<p>Apply professional vocabulary, draw up and execute business documents in the field of activity for solving problems of interpersonal and intercultural interaction</p>	<p>BM 1. The use of professional vocabulary, the preparation of business papers in the field of professional activity.</p>
<p>BC 2</p>	<p>Use the basics of philosophical knowledge, be aware of oneself and one's place in society, tolerate social, political, ethnic, confessional and cultural</p>	<p>BM 2. Application of the foundations of philosophical knowledge, social sciences for socialization and</p>

	development.	adaptation in society and the workforce.
BC 3	Understand the history, role and place of Kazakhstan in the world community	BM 03. Understanding the history, the role and place of Kazakhstan in the world community, respectful and caring attitude to historical heritage and cultural traditions
BC 4	Understand the basic laws and mechanisms of the functioning of the modern economic system, the willingness to protect their rights in accordance with labor legislation and use regulatory legal documents in their activities	BM 4. The use of basic knowledge of the economy and knowledge of labor laws and regulations to protect their rights in their professional activities
BC 5	Maintain and develop an adequate level of physical fitness to ensure full social and professional activities	BM 5. Development and improvement of physical qualities
BC 6	Perform sketches, diagrams and drawings, read the technological documentation, use the application packages of the development of design and technological documentation.	BM 6. Performance, design, reading of design and technological documentation using application programs
Professional competence		
PC 1	Perform basic plumbing work	PM 1. Carrying out metalwork and plumbing, assembly works
PC 2	Analyze electrical installations and systems	PM 2. Analysis of the operation of electrical installations and systems
PC 3	Perform work on the installation of electrical equipment, cable and overhead lines	PM 3. Installation of elements of electrical equipment, cable and overhead lines
PC 4	Perform maintenance of shop electrical and electromechanical equipment	PM 4. Maintenance of shop electrical and electromechanical equipment
PC 5	Repair electrical and electromechanical equipment, cable	PM 5. Repair of electrical and electromechanical

	and overhead lines	equipment, cable and overhead lines
PC 6	Perform work on the elimination and prevention of accidents and malfunctions of electrical equipment, cable and overhead lines	PM 6. Performance of work on the elimination and prevention of accidents and malfunctions of electrical equipment, cable and overhead lines
PC 7	Make calculations for the efficient use of enterprise resources	PM 7. Performance of calculation for the effective use of enterprise resources

4. LIST OF MODULES AND LEARNING OUTCOMES

Module name	Learning outcomes (in accordance with the professional tasks)	Assessment Criteria for learning outcomes	Disciplines that form the module
Basic modules			
BM 1. The use of professional vocabulary, preparation of business papers in the field of professional activity	LO1. To know the grammar and terminology of the Kazakh (Russian) and foreign languages for communication in the sphere of their professional activities	1. Knowledge of lexical and grammatical material in the specialty necessary for professional communication.	Professional Kazakh (Russian) language. Professional foreign language. Office work in the state language
		2. Understanding the significance of written and oral communication in Kazakh (Russian) and foreign languages.	
		3. Use of communication skills to establish and develop relations of cooperation and partnership.	
		4. Writing texts using various presentation forms.	
	LO2. To know the translation technique (with a dictionary) of professional-oriented texts	1. Reading and translation (with a dictionary) texts of professional orientation.	
		2. Independent preparation of coherent, logical reasoned statements in	

		accordance with the proposed topic.	
		3. Understanding of topics for discussion and participation in discussions.	
	LO3. To work with organizational, administrative, information and reference documents using computer technologies	1. Drawing up in Kazakh (Russian) and foreign languages a summary, 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. Application of the foundations of philosophical knowledge, social sciences for socialization and adaptation in society and the workforce.	LO1. To determine the ratio in the life of a person of such philosophical categories as freedom and responsibility, material and spiritual values.	1. Understanding the essence of social and ethical problems associated with the development and use of the achievements of science, engineering and technology.	Basics of philosophy. Basics of political science and sociology. Culturology .
		2. Understanding the essence of the process of knowledge and different points of view on the process of knowledge in the history of philosophy.	

	3. Application of skills for analyzing the main world outlook and methodological problems arising in science at the present stage of its development.
LO2. To understand international political processes, geopolitical situation	1. The use of political knowledge in everyday life and in their professional activities.
	2. Participation in discussions on current issues, problems and prospects for development, etc.
	3. The use of social, moral and legal norms governing the attitude of a person to a person, society, environment.
LO3. To understand the moral values and norms that form tolerance and an active personal position	1. Understanding the role and place of culture of the peoples of the Republic of Kazakhstan in the world civilization.
	2. The use of approaches and methods of critical analysis in relation to various cultural forms and processes of modern life of society.

		3. Application of national traditions and customs of various countries in their professional activities.	
BM 3. Understanding the history, role and place of Kazakhstan in the world community	LO1. To understand major historical events	1. Understanding of the chronology and essence of historical events from antiquity to the present.	History of Kazakhstan
		2. Understanding of the nature and purpose of the political and social changes taking place in the Republic of Kazakhstan after independence.	
		3. Characteristics of the achievements of independent Kazakhstan	
	LO2. To identify causal relationships of historical events.	1. Determination of the main facts, processes and phenomena, reflecting and characterizing the integrity and consistency of the history of Kazakhstan	
		2. Establishing the connection between historical events	
		3. Ability to work with historical sources	
LO3. To possess knowledge for the development of national identity	AC3.1 The role and place of the Kazakh people in the common Turkic community, in the system of nomadic civilization, in the development of the historical and cultural community of the		

		peoples of the Eurasian world	
		2. Demonstration of spatial thinking, the ability to analyze historical material	
		3. Characteristics of Kazakhstan in the system of foreign political relations of the modern world	
BM 4. The use of basic knowledge of the economy and knowledge of labor laws and regulations to protect their rights in their professional activities	LO1. To determine the forms and types of ownership, types of plans, basic economic indicators of the enterprise	1. Performance of necessary economic calculations using mathematical methods.	Fundamentals of Economics. Law basics.
		2. Discussion of the main economic indicators of the enterprise.	
		3. Measurement of the cost of working time to perform a certain work.	
		4. Determination of methods to reduce costs and increase profitability.	
	LO2. To understand the development trends of the world economy, the main objectives of the transition to a green economy	1. Understanding the main objectives of the state transition to a "green" economy.	
		2. The use of basic methods for calculating gross domestic product and gross national product.	
3. Definition of global economic problems, ways to overcome them.			

	LO3. To protect rights in accordance with labor laws	<p>1. Understanding of the legal status in the formation of the identity of a citizen in accordance with the provisions of the Constitution of the Republic of Kazakhstan.</p> <p>2. The use of evidence-based argumentation of their own position in specific legal situations using regulations.</p> <p>3. Understanding of responsibility for administrative and corruption offenses.</p>	
BM 5. Development and improvement of physical qualities	LO1. To strengthen health and healthy lifestyle	1. Understanding the importance of physical culture for health promotion, the role of physical culture and sports in the development of the country.	Physical culture.
		2. Performing a set of exercises for general physical training.	
		3. Application of the rules of a healthy lifestyle in everyday life.	
	LO2. To improve physical qualities and psycho-physiological abilities	1. Knowledge of technique of doing exercises.	
		2. Compliance with the rules of team sports.	

		<p>3. Application of the studied methods of games and individual tactical tasks in the educational game.</p> <p>4. Implementation of control standards and tests provided by the program.</p>	
	LO3. To provide first aid for injuries and accidents	<p>1. Understanding the causes of injuries during exercise, methods of injury prevention.</p> <p>2. Provision of medical care for injuries.</p> <p>3. Evaluation of the difficulties and risks arising during the performance of various physical activities, their own and others' physical capabilities.</p>	
BM 6. Performance, design, reading of design and technological documentation using application programs	LO1. To follow the rules of design documentation	<p>1. Understanding of the rules of design documentation</p> <p>2. Drawing according to the rules of a unified system of design documentation.</p> <p>3. Determination of the purpose and scale of the drawing technical details.</p> <p>4. Meeting the requirements of the unified system for design documentation</p>	Engineering graphics. Computer design

		(ESKD).	
	LO2. To have the skills of projecting on the plane	1. Performance and design of the necessary cuts on the drawings.	
		2. Performance of axonometric projection.	
		3. Drawing of schemes according to symbols, according to a unified system of design documentation.	
		4. Application of computer graphics techniques	
	LO3. To develop and design schemes for the specialty with the help of the application package.	AC3.1. Performance of specialty schemes using technical drawing tools.	
		2. The use of modern software applications.	
		3. Computer graphics, 3D graphics.	
Professional modules			
PM 1. Carrying out metalwork and assembly works	LO1. Identify properties and classify materials used in production.	1. The use of basic electrical materials used in production.	Electrotechnical materials science. Fundamentals of technical mechanics. Industrial training and / or
		2. Determination of properties and scope of the main electrical materials used in production.	
		3. Selection of electrical materials for their intended use.	

	LO2. To perform strength calculations for various types of deformation	1. Determination of the geometric characteristics of flat sections, the moment of forces relative to a point and axis, the center of gravity of flat geometric figures and standard profiles.	professional practice (fitting and mechanical practice).
		2. Performance of verification design calculations of the permissible load for various types of deformation.	
		3. Calculations of strength, gears, bearings, shafts, detachable and one-piece connections.	
		4. Selection of the basic parameters of mechanical motion, the force of inertia, using the method of kinetostatics and the basic theorems of dynamics.	
	LO3. To perform various ways of cutting and chopping metal	1. Knowledge of the process of metalwork processing.	
		2. The use of tools and instrumentation, tools and accessories when performing plumbing work.	
		3. The use of various methods and means of measurement in the manufacture of equipment parts.	
		4. Performance of technical measurements	

		according to the drawings.	
		5. Compliance with safety rules when cutting, cutting, bending, editing and filing metal.	
PM 2. Analysis of the operation of electrical installations and systems	LO1. To understand the principles of production, transmission and distribution of electrical energy	1. Determining the destination sources and consumers of electrical energy.	Theoretical foundations of electrical engineering Electrical measurements. Electrical machines and transformers. Industrial training and / or professional practice (Educational practice).).
		2. The use of definitions of the basic laws and properties of electrical (magnetic) circuits in solving professional problems.	
		3. Determination of the characteristics of DC and AC circuits, linear and non-linear circuits.	
	LO2. To perform electrical measurement	1. Selection of primary transducers for measuring various physical quantities.	
		2. Determination of methods and methods for measuring current, voltage, power, electrical energy, resistance, power factor, frequency, inductance and capacitance.	
		3. Measurement of the main parameters and characteristics of electrical circuits, basic electrical quantities, characteristics of electric and magnetic fields.	

	4. Measurement of current, voltage, power, electrical energy, power factor, frequency in various electrical circuits and devices.
	5. Selection of measuring devices of various systems and types for specific professional tasks.
LO3. To select electric motor for various working machines	1. Calculation of parameters of electric machines of direct and alternating current, as well as a transformer.
	2. Assembly of schemes, production of start-up and regulation of the frequency of rotation of the induction motor, the construction characteristics.
	3. Analysis of the conditions for the inclusion of transformers for parallel operation.
	4. Assembly of schemes and study of the transformer in the work mode and in nominal modes, in the idle mode and short circuit mode.
	5. Power calculation and selection of an electric motor for various kinds of working machines.

PM 3. Maintenance of shop electrical and electromechanical equipment	LO1. To identify typical nodes of modern electronic devices	1. Explanation of devices, principles of operation, basic technical parameters, marking, symbols and scope of various semiconductor devices.	Basics of industrial electronics. Electrical and electromechanical equipment industry. Automatic control of the drive Maintenance and repair of electrical equipment
		2. Calculation of rectifiers and the compilation of truth tables for logical elements.	
		3. Selection of types of electronic devices, depending on the characteristics of their application.	
		4. Reading of simple diagrams of typical electronic equipment.	
		5. Making diagrams of connection and connection of control devices.	
	LO2. To carry out maintenance of electrical equipment	1. Selection of the necessary equipment depending on the technical requirements.	
		2. Determination of the characteristics and mode of operation of the motor DC and AC.	
		3. Determination of damage and evaluation of the technical condition of electrical equipment.	
		4. Determination of the technical condition of electrical equipment.	
		5. Registration of technical documentation in the	

		process of maintenance of electrical equipment.	
	LO3. To carry out automatic control of the electric drive during the operation of electrical and electromechanical equipment	1. Automatic control of the electric drive when operating electrical and electromechanical equipment.	
		2. Drawing up diagrams of connection and connection of control devices and protection of the electric drive.	
		3. Determination of the place of damage in the control equipment of the automated electric drive.	
		4. Carrying out work on the organization of maintenance of automatic control systems for electric drives.	
PM 4. Installation of elements electrical equipment cable and overhead lines	LO1. To assess the state of the existing electrical equipment	1. Definition of design features of power lines and electrical equipment of power plants and substations.	Maintenance and repair of electrical equipment Adjustment of electrical equipment. Power supply of facilities Industrial training and / or professional practice (educational and industrial
		2. Using the method of calculating electrical networks for voltage loss.	
		3. Selection of necessary equipment depending on the technical requirements.	
		4. Application of the method of detecting defects in the mechanical part, magnetic cores, contact	

	connections, insulation, connection diagrams.	practice).
	5. Compliance with safety requirements when performing installation work.	
LO2. To organize the work on the assembly and installation of electrical equipment.	1. Application of cable laying methods: in trenches; in blocks; in the tunnels; on overpasses; in the galleries.	
	2. Knowledge of technology for cutting cable ends, installation and repair of couplings.	
	3. Installation of grounding and zeroing of overhead power lines.	
	4. Selection of materials based on their properties for use in the installation of low voltage overhead power lines	
LO3. To perform electrical installation of open and closed switchgear	1. Cutting power and control cables, crimping and soldering lugs, connecting and terminating the cores of cables and wires.	
	2. Installation in accordance with the project of production of works, working drawings, the requirements of regulatory documents.	
	3. Completion of materials and equipment for	

		electrical work.	
PM 5. Repair of electrical and electromechanical equipment, cable and overhead lines	LO1. To select electrical equipment of power lines	1. Characteristics of supports, wires and structural elements of overhead power lines.	Electrical equipment of power lines for substations and distribution networks Operation, repair and adjustment of electrical equipment of electrical networks Industrial training and / or professional practice (Introductory practice).
		2. Performance of mechanical calculation of overhead power lines	
		3. Determination of power loss in the elements of the electrical network.	
		4. Calculation of simple and complex closed networks.	
	LO2. To select technological equipment for the repair and operation of electrical machines and apparatus, electrical devices and systems	1. Determination of the error of measuring instruments, accuracy classes of electrical measuring instruments.	
		2. Selection of necessary equipment depending on the technical requirements.	
		3. Preparation of applications for the purchase of consumables and spare parts.	
		4. Characteristics of devices, open and closed distribution devices, devices of the complete prefabricated switchgear unilateral service, complete prefabricated switchgear of the internal installation.	

	LO3. To arrange repair work	<p>1. Listing causes and conditions causing damage to electrical networks.</p> <p>2. Characterization of types of damage in cable networks and ways to eliminate them</p> <p>3 Explanation of the production technology of the workshop, the purpose and modes of operation of the main equipment</p> <p>4. Scheduling planned preventive work on the repair cycle</p> <p>5. Analysis of the causes of equipment failures</p>	
PM 6. Perform work on the elimination and prevention of accidents and malfunctions of electrical equipment, cable and overhead lines	LO1. To carry out the choice of protection and electrics for power supply networks of an industrial enterprise	<p>1. Assembling the connection circuit of the secondary windings of current transformers, voltage transformers</p> <p>2. Testing of relay protection for high-voltage motor, step-down transformer, automatic switch-on reserve, automatic switch-on circuit</p> <p>3. Diagnostics of electrical equipment, its units and systems and eliminate the simplest malfunctions and malfunctions.</p> <p>4. Awareness of methods for calculating and ensuring reliable lightning protection of</p>	Relay protection and electrics New energy technologies Labor protection Industrial training and / or professional practice (Industrial practice).

	power lines, power stations and substations, buildings and structures.
LO2. To control the operation mode of the equipment of electric power industry facilities	1. Ensuring the stable operation of low-voltage equipment of electrical power systems in conditions of internal overvoltage.
	2. Determination of the types of major defects and electrical equipment malfunctions.
	3. Identification and troubleshooting during the turnaround cycle and repair work.
	4. Identification of the need for organizational and technical measures to improve the efficiency and operational reliability of electrical networks for various purposes.
	5. Selection of operating mode, ensuring reliable operation of the equipment.
LO3. To carry out organizational measures to ensure safe operation	1. Use of personal protective equipment when working.
	2. Ability to release the victim from the effects of electric current.
	3. Ability to instruct and complete acts H and I.
	4. First aid performance to victims.

PM 7. Perform calculation for the effective use of enterprise resources	LO1. To develop measures to improve economic efficiency and modernization	1. Cost estimate for the purchase and installation of electrical equipment.	Power supply network management. Economy of the industry. Industrial training and / or professional practice (Pre-diploma practice)
		2. Paperwork for the receipt of material values from the shop warehouses.	
		3. Carrying out activities to increase the service life of equipment, reduce its downtime and increase shifts, reduce the complexity and cost of repairs, improve its quality.	
		4. Carrying out activities to study the best practices of domestic and foreign experience in operational and maintenance of equipment and its implementation.	
	LO2. To carry out planning and management of the work of the personnel of the production unit	1. Determination of the main stages of production planning.	
		2. Distribution of work according to the shift task.	
		3. Drawing up schemes of interdepartmental and intrashop electric networks.	
		4. Analysis of the existing equipment for moral and technical wear.	
		5. Scheduling	

	preventive maintenance work on the repair cycle.
LO3. To perform economic calculations for the preparation of feasibility studies and estimates of working projects	1. Management of a separate production unit within the functions assigned to specialists with secondary special education.
	2. Identification of the norm of repair complexity of the installed equipment and the complexity of the repair work.
	3. Calculation of the planned salary fund for the maintenance and repair of electrical facilities of the enterprise and the costs of operation and maintenance of equipment.
	4. Implementation of the estimated cost of capital expenditures in the implementation of equipment.
	5. Calculation of the efficiency ratio and the payback period of the equipment.

4 MODULE SPECIFICATION

4.1 Specification of the Module BM 1 “Application of professional vocabulary, drafting of official papers in the field of professional activity”

Scope of competence	-
Module name	The use of professional vocabulary, the preparation of 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 and make business papers in the state language
Level of professional qualification	4
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 be aware of the translation technique (with a dictionary) of professional-oriented texts. 3. To work with organizational, administrative, and information and reference documents using computer technology.
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Knowledge 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
Disciplines that form the module	- Professional Kazakh (Russian) language; - Professional foreign language; - Office work in the state language.
Module type (mandatory, optional)	Mandatory
Labor intensity (credits /academic hours)	6 credits/180 hours
Duration of the module	3-5 semester
Form of training	Full-time
Education technology	Modular
Teaching methods	Verbal (conversation, lecture); visual practical; problem search; reproductive; inductive; case method
Forms of control	Pass/fail exam, exam
Required Resources	Personal Computer; software; presentations; electronic resources; support cards; handouts.
Language of instruction	Russian, Kazakh
Post-requisites	1 PM-7 PM.

4.2 Specification of the Module BM 2 “Application of basics of philosophical knowledge, social sciences for socialization and adaptation in the society and the workers’ association”

Scope of competence	-
Module name	Application of the basics of philosophical knowledge, social sciences for socialization and adaptation in society and the workforce
Purpose of the module	After studying this module, the student will be able to apply the basics of philosophical knowledge, social sciences for socialization and adaptation in society and the workforce.
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To determine the ratio in the life of a person of such philosophical categories as freedom and responsibility, material and spiritual values. 2. To understand the international political processes, the geopolitical situation. 3. To understand the moral values and norms that form tolerance and an active personal position.
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Understanding the essence of social and ethical problems associated with the development and use of the achievements of science, technology and technology. 2. Understanding the essence of the process of knowledge and different points of view on the process of knowledge in the history of philosophy. 3. Application of skills to analyze the main world outlook and methodological problems arising in science at the present stage of its development. 4. The use of political science knowledge in everyday life and in their professional activities. 5. Participation in discussions on topical issues, problems and prospects for development, etc. 6. The use of social, moral and legal norms governing the attitude of a person to a person, society, environment 7. Understanding the role and place of culture of the peoples of the Republic of Kazakhstan in world civilization. 8. The use of approaches and methods of critical analysis in relation to various cultural forms and

	processes of modern life of society. 9. Application of national traditions and customs of various countries in their professional activities.
Prerequisites	World history; History Of Kazakhstan; Ecology; Basics of economic theory.
Disciplines that form the module	- Basics of philosophy; - The basics of political science and sociology; - Cultural studies.
Module type (mandatory, optional)	Mandatory
Labor intensity (credits /academic hours)	6 credits/180 hours
Duration of the module	3- 7 semester
Form of training	Full-time /dual
Education technology	Modular
Teaching methods	Verbal (conversation, lecture); visual practical; problem search; reproductive; inductive; case method
Forms of control	Pass/fail exam, exam
Required Resources	Personal computer software; presentations; electronic resources; support cards; handouts
Language of instruction	Russian, Kazakh
Post-requisites	History of Kazakhstan; Economic theory.

4.3 Specification of the basic module 3 “Understanding of the history, role and place of Kazakhstan in the world community, respectful and careful attitude towards important historical heritage and cultural traditions”

Scope of competence	-
Module Name and code	Understanding of the history, role and place of Kazakhstan in the world community, respectful and caring attitude to historical heritage and cultural traditions
Purpose of the module	After studying this module, the student will be able to understand the history, role and place of Kazakhstan in the world community.
Level of professional qualification	4
Learning outcomes modulo	<ol style="list-style-type: none"> 1. To understand the main historical events. 2. To determine the causal relationships of historical events. 3. To know principles of the development of national identity.
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Understanding of the chronology and essence of historical events from antiquity to the present. 2. Understanding the nature and purpose of the political and social changes taking place in the Republic of Kazakhstan after independence. 3. Characteristics of the achievements of independent Kazakhstan. 4. Determination of the main facts, processes and phenomena that reflect and characterize the integrity and consistency of the history of Kazakhstan. 5. Establishing the connection between historical events. 6. Ability to work with historical sources. 7. The role and place of the Kazakh people in the common Turkic community, in the system of nomadic civilization, in the development of the historical and cultural community of the peoples of the Eurasian world. 8. Demonstration of spatial thinking, the ability to analyze historical material. 9. Characteristics of Kazakhstan in the

	system of foreign political relations of the modern world.
Prerequisites	History, Man and Society, Basics of Law
Disciplines that form the module	Modern history of Kazakhstan
Module type (mandatory, optional)	Mandatory
Labor intensity (credits /academic hours)	4 credits /120 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Form of organization of educational process	Lecture, independent work, practical classes, laboratory classes, practice
Teaching methods	Oral questioning, testing, report, abstract, creative task
Forms of control	Pass/fail exam, exam
Required Resources	Personal computer, educational and methodical literature in the following disciplines: Modern history of Kazakhstan, cultural studies. Kaan G.V. History of Kazakhstan: Almaty City Baspasy. - 2011. Kolomeitseva O.A. Modern history of Kazakhstan, Almaty, 2016
Language of instruction	Kazakh, Russian
Post-requisites	Fundamentals of Philosophy, Fundamentals of Sociology and Political Science

4.4 Specification of the Basic Module 4 “Application of basic knowledge of economy and knowledge of labor legislation and legal norms for the protection of their rights in professional activity”

Scope of competence	-
Module name	Application of basic knowledge of economics and knowledge of labor laws and regulations to protect their rights in their professional activities
Purpose of the module	After studying this module, the student will be able to apply basic knowledge of economics and knowledge of labor laws and regulations to protect their rights in their 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 ownership, types of plans, the main economic indicators of the enterprise. 2. To understand the development trends of the world economy, the main objectives of the state transition to a green economy. 3. To protect rights in accordance with labor laws
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Perform the necessary economic calculations using mathematical methods. 2. Discussion of the main economic indicators of the enterprise. 3. Conducting measurements of the cost of working time to perform a certain work. 4. Definition of methods to reduce costs and improve profitability. 5. Understanding the main objectives of the state's transition to a "green" economy. 6. The use of basic methods of calculating gross domestic product and gross national product. 7. Definition of global economic problems, ways to overcome them 8. Understanding of the legal status in the formation of the identity of a citizen in accordance with the provisions of the Constitution of the Republic of Kazakhstan. 9. Application of evidence-based argumentation of one’s own position in specific legal situations using normative acts. 10. Understanding of responsibility for administrative and corruption offenses.

Prerequisites	Philosophy; Political science; Basics of computer science; Math modeling; Story; History of Kazakhstan; Man and society; Basics of state and law.
Disciplines that form the module	- Basics of Economics; - Law basics.
Module type (mandatory, optional)	Mandatory
Labor intensity (credits /academic hours)	4 credit/120 hours
Duration of the module	5-6 semester
Form of training	Full-time
Education technology	Modular
Teaching methods	Verbal (conversation, lecture); visual practical; problem search; reproductive; inductive; case method Oral / written survey, cards, independent work
Forms of control	Pass/fail exam
Required Resources	Personal computer software; presentations; electronic resources; support cards; handouts
Language of instruction	Russian, Kazakh
Post-requisites	Microeconomics; Macroeconomics; World economy and international relations; State regulation of the economy; Marketing; Management.

4.5 Specification of the Module BM 5 “Development and improvement of physical qualities”

Scope of competence	-
Module name	Development and improvement of physical qualities
Purpose of the module	After studying this module, the student 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 aid for injuries and accidents.
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Understanding the importance of physical culture for health promotion, the role of physical culture and sports in the development of the country. 2. Performing a set of exercises for general physical training. 3. Application of the rule of a healthy lifestyle in everyday life. 4. Mastering the technique of doing the exercise. 5. Compliance with the rules of team sports. 6. Application of the studied methods of games and individual tactical tasks in the educational game. 7. Implementation of control standards and tests provided by the program. 8. Understanding the causes of injury during exercise, methods of injury prevention. 9. Provision of medical care for injuries. 10. Evaluation of the difficulties and risks arising during the execution of various physical activities, own and others' physical capabilities.
Prerequisites	Anatomy; Human physiology; Physiology; Hygiene; Valeology; Pedagogy; Psychology; Biology.
Disciplines that form the module	- Physical culture.
Module type (mandatory, optional)	Mandatory
Labor intensity (credits RK/academic hours)	6 credits/180 hours
Duration of the module	3-8 semester

Form of training	Full-time
Education technology	Modular
Teaching methods	Verbal (conversation, lecture); visual practical; problem search; reproductive; inductive; case method.
Forms of control	Pass/fail exam, exam
Required Resources	Display of movements in nature or in the form of images and should be perceived by means of direct observation.
Language of instruction	Russian, Kazakh
Post-requisites	Basics of life safety.

4.6 Specification of the Basic Module BM 6 “Performance, design, reading of design and technological documentation using application programs”

Scope of competence	-
Module name	Execution, execution, reading of design and technological documentation using application programs
Purpose of the module	After studying this module, the student will be able to perform, design, read design and technological documentation using application programs.
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To perform drawings of parts. 2. To perform drawings of general view and assembly drawings from sketches using a package of software applications. 3. To develop and design schemes for the specialty with the help of the application package.
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Identification of the format of the drawings, the main and additional lines of the drawing, drawing fonts. 2. Projection of geometric bodies and their axonometry, parts, necessary cuts, sections, image and designation of threads, sketches, drawings of parts, assembly and installation drawings, kinematic, electrical and hydraulic circuits of medium complexity. 3. Drawings of detachable and permanent connections 4. Compliance with the requirements of the unified system of design documentation (ESKD). 5. Knowledge of the rules of design and reading of general view drawings and assembly drawings. 6. Registration of assembly drawings according to sketches. 7. Reading of assembly drawings. 8. Application of computer graphics techniques. 9. Implementation of schemes in the specialty, using the means of technical drawing. 10. The use of modern software applications. 11. Possession of computer graphics, the use of 3D-graphics.
Prerequisites	Mathematics, geometry and stereometry of the school program; Computer science; Object oriented Programming.
Disciplines that form the module	<ul style="list-style-type: none"> - Drawing; - Computer graphics.
Module type (mandatory,	Mandatory

optional)	
Labor intensity (credits /academic hours)	4 credit/120 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Teaching methods	Verbal (conversation, lecture); visual practical; problem search; reproductive; inductive; case method.
Forms of control	Pass/fail exam, exam
Required Resources	Personal computer; software; presentations; electronic resources; support cards; handouts.
Language of instruction	Russian, Kazakh
Post-requisites	Basics of computer simulation.

4.7 Specification of Professional Module 1 “Carrying out metalwork and assembly work”

Scope of competence	Locksmith parts of electrical and electromechanical equipment
Module name	Carrying out metalwork and assembly works
Purpose of the module	By the end of this module, the student will carry out the fitting and assembly work.
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To determine the properties and classify the materials used in production. 2. To perform strength calculations for various types of deformation. 3. To perform various ways of cutting and chopping metal.
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. The use of basic electrical materials used in production. 2. Identification of the properties and scope of the main electrical materials used in production. 3. Selection of electrical materials for their intended use. 4. Determination of the geometric characteristics of flat sections, the moment of forces relative to a point and axis, the center of gravity of flat geometric figures and standard profiles. 5. Performance of verification, design calculations of the allowable load for various types of deformation. 6. Performance of calculations for strength, gears, bearings, shafts, detachable and one-piece connections. 7. Selection of the basic parameters of mechanical motion, the force of inertia, using the method of kinetostatics and the basic theorems of dynamics. 8. Mastery of the process of metalworking. 9. The use of tools and instrumentation, tools and accessories when performing plumbing work. 10. The use of various methods and means of measurement in the manufacture of parts equipment. 11. Performance of technical measurements according to the drawings. 12. Compliance with safety when cutting, bending,

	editing and filing metal.
Prerequisites	- Physics; Maths; Engineering graphics; Theoretical foundations of electrical engineering.
Disciplines that form the module	- Electrotechnical materials science; - Fundamentals of technical mechanics; - Industrial training and / or professional practice (fitting and mechanical practice).
Module type (mandatory, optional)	Mandatory
Labor intensity (credits /academic hours)	12 credits/360 hours
Duration of the module	3 semester
Form of training	Full-time
Education technology	Modular
Teaching methods	Verbal (conversation, lecture); visual practical; problem search; reproductive; inductive; case method.
Forms of control	Pass/fail exam, exam
Required Resources	Personal computer; software; presentations; electronic resources; support cards; handouts.
Language of instruction	Russian, Kazakh
Post-requisites	Fundamentals of the theory of electrical devices; Electric cars; Electric part of power stations; graduation design.

4.8 Specification of the Professional Module 2 “Performance of fitting and metalwork-assembly works”

Scope of competence	Organization and production of electrical equipment maintenance
Module name	Analysis of the operation of electrical installations and systems
Purpose of the module	After studying this module, the student will be able to analyze the work of electrical installations and systems
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To understand the principles of production, transmission and distribution of electrical energy. 2. To perform electrical measurement 3. To make the choice of an electric motor for various kinds of working machines.
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Identification of the destination of sources and consumers of electrical energy. 2. The use of definitions of the basic laws and properties of electrical (magnetic) circuits in solving professional problems. 3. Identification of features of DC and AC circuits, linear and non-linear circuits. 4. Selection of primary measuring transducers for measuring various physical quantities. 5. Identification of methods and methods for measuring current, voltage, power, electrical energy, resistance, power factor, frequency, inductance and capacitance. 6. Measurement of the main parameters and characteristics of electrical circuits, basic electrical quantities, characteristics of electric and magnetic fields. 7. Measurement of current, voltage, power, electrical energy, power factor, frequency in various electrical circuits and devices. 8. Selection of measuring devices of various systems and types to perform specific professional tasks. 9. Calculation of parameters of electric machines of direct and alternating current, as well as a transformer. 10. Implementation of the assembly schemes, produces start and speed control

	<p>asynchronous motor, building characteristics.</p> <p>11. Analysis of the conditions for the inclusion of transformers for parallel operation.</p> <p>12. Implementation of the assembly schemes and the study of the transformer in the working and nominal modes, in idle mode and short circuit mode.</p> <p>13. Calculation of power and selection of electric motor for various kinds of working machines.</p>
Prerequisites	- Physics; Maths; Theoretical foundations of electrical engineering; Theoretical mechanics; Electrical materials.
Disciplines that form the module	- Theoretical foundations of electrical engineering; - Electrical measurements; - Electrical machines and transformers; - Industrial training and / or professional practice (Educational practice).
Module type (mandatory, optional)	Mandatory
Labor intensity (credits /academic hours)	9 credits/ 270 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Teaching methods	Verbal (conversation, lecture); visual practical; problem search; reproductive; inductive; case method.
Forms of control	Pass/fail exam, exam
Required Resources	Personal Computer; software; presentations; electronic resources; support cards; handouts.
Language of instruction	Russian, Kazakh
Post-requisites	Electric cars; Electrical Engineering; Electric power industry; Electrical and electrical equipment; Relay protection and automatics; Electricity networks and systems; Power supply.

4.9 Specification of Professional Module 3 “Analysis of electrical installations and systems operation”

Scope of competence	Technical and operational maintenance of elements of electrical and electromechanical equipment
Module name	Maintenance of shop electrical and electromechanical equipment
Purpose of the module	After studying this module, the student will be able to perform maintenance of shop electrical and electromechanical equipment.
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To determine the typical units of modern electronic devices. 2. To carry out maintenance of electrical equipment. 3. To carry out automatic control of the electric drive during the operation of electrical and electromechanical equipment.
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Explanation of devices, principles of operation, basic technical parameters, marking, symbols and scope of various semiconductor devices. 2. Calculation of rectifiers and compilation of truth tables for logic elements. 3. Selection of types of electronic devices, depending on the characteristics of their application. 4. Reading simple diagrams of typical electronic equipment. 5. Drawing up diagrams of connection and connection of control apparatus. 6. Selection of the necessary equipment depending on the technical requirements. 7. Identification of the characteristics and mode of operation of an AC and DC motor 8. Identification of damage and evaluation of the technical condition of electrical equipment. 9. Identification of the technical condition of electrical equipment. 10. Registration of technical documentation in the process of maintenance of electrical equipment. 11. Implementation of automatic control of the electric drive in the operation of electrical and electromechanical equipment. 12. Drawing up diagrams of connection and connection of control devices and protection of the

	<p>electric drive.</p> <p>13. Identification of the place of damage in the control equipment of the automated electric drive.</p> <p>14. Carrying out work on the organization of maintenance of automatic control systems for electric drives.</p>
Prerequisites	Physics; Maths; Theoretical foundations of electrical engineering; Electric cars; Electrical measurements; Electrical Engineering; Electricity.
Disciplines that form the module	<ul style="list-style-type: none"> - Fundamentals of industrial electronics; - Electrical and electromechanical equipment industry; - Electrical equipment of power lines of substations and distribution networks; - Automatic control of the drive; - Operation and repair of electrical equipment.
Module type (mandatory, optional)	Mandatory
Labor intensity (credits /academic hours)	12 credits/360 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Teaching methods	Verbal (conversation, lecture); visual practical; problem search; reproductive; inductive; case method.
Forms of control	Pass/fail exam, exam
Required Resources	Personal Computer; software; presentations; electronic resources; support cards; handouts.
Language of instruction	Russian, Kazakh
Post-requisites	Electrical industry; Electronic control systems; Power supply; Electrical systems and networks.

5.10 Specification of the Professional Module 4 “Installation of electrical equipment, cable and overhead lines”

Scope of competence	Technical and operational maintenance of elements of electrical and electromechanical equipment
Module name	Installation of electrical equipment, cable and overhead lines
Purpose of the module	By the end of this module, the student will be able to perform work on the installation of electrical equipment, cable and overhead lines
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To assess the state of the existing electrical equipment. 2. To organize the work on the assembly and installation of electrical equipment. 3. To install electrical equipment of open and closed switchgears.
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Determination of the design features of power lines and electrical equipment of power plants and substations. 2. Using the method of calculating electrical networks for voltage loss. 3. Selection of the required equipment depending on the technical requirements. 4. Using the method of detecting defects in the mechanical part, magnetic cores, contact connections, insulation, connection diagrams. 5. Compliance with safety requirements when performing installation work. 6. Application of cable laying methods: in trenches; in blocks; in the tunnels; on 7. Awareness of technology for cutting cable ends, installation and repair of couplings. 8. Installation of grounding and zeroing overhead power lines. 9. Selection of materials based on their properties for use in the installation of low-voltage overhead power lines. 10. Cutting power and control cables, crimping and soldering lugs, connecting and terminating the cores of cables and wires. 11. Installation in accordance with the project of

	work, working drawings, the requirements of regulatory documents. 12. Acquisition of materials and equipment for electrical work.
Prerequisites	Theoretical foundations of electrical engineering; Physics; Electric part of power stations and substations; Basics of life safety.
Disciplines that form the module	- Operation and repair of electrical equipment; - Adjustment of electrical equipment; - Power supply facilities; - Industrial training and / or professional practice (Educational practice).
Module type (mandatory, optional)	Mandatory
Labor intensity (credits /academic hours)	10 credits / 300 hours
Duration of the module	3-8semester
Form of training	Full-time
Education technology	Modular
Teaching methods	Verbal (conversation, lecture); visual practical; problem search; reproductive; inductive; case method.
Forms of control	Pass/fail exam, exam
Required Resources	Personal computer; software; presentations; electronic resources; support cards; handouts.
Language of instruction	Russian, Kazakh
Post-requisites	Operation of electric power systems; Graduation design.

4.11 Specification of Professional Module 5 “Repair of electrical and electromechanical equipment, cable and overhead lines”

Scope of competence	Technical and operational maintenance of elements of electrical and electromechanical equipment
Module name	Repair of electrical and electromechanical equipment, cable and overhead lines
Purpose of the module	By the end this module, the student will be able to perform work on the repair of electrical and electromechanical equipment, cable and overhead lines
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To make a choice of electrical equipment of power lines. 2. To select technological equipment for the repair and operation of electrical machines and apparatus, electrical devices and systems. 3. To organize the execution of repair work.
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Characteristics of supports, wires and structural elements of overhead power lines. 2. Performance of mechanical calculation of overhead power lines. 3. Identification of power loss in the elements of the electrical network. 4. Calculation of simple and complex closed networks. 5. Identification of the error of measuring instruments, accuracy classes of electrical measuring instruments. 6. Selection of necessary equipment depending on technical requirements. 7. Preparation of applications for the purchase of consumables and spare parts. 8. Characteristics of devices, open and closed switchgears, devices of complete prefabricated switchgear unilateral service, complete prefabricated switchgear of internal installation. 9. Enumeration of the causes and conditions causing damage to electrical networks. 10. Characteristics of damage in cable networks and ways to eliminate them. 11. Explanation of the production technology of the workshop, the purpose and modes of operation of

	<p>the main equipment.</p> <p>12. Scheduling planned preventive work on the repair cycle.</p> <p>13. Analysis of the cause of equipment failures</p>
Prerequisites	Physics; Electrical engineering; Electric cars; Theoretical foundations of electrical engineering; Electrical measurements; Electrical Engineering; Information and measuring equipment, Engineering and computer graphics.
Disciplines that form the module	<ul style="list-style-type: none"> - Electrical equipment of power lines of substations and distribution networks; - Operation, repair and adjustment of electrical equipment of electrical networks; - Industrial training and / or professional practice (Introductory practice).
Module type (mandatory, optional)	Mandatory
Labor intensity (credits /academic hours)	14 credits / 420 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Teaching methods	Verbal (conversation, lecture); visual practical; problem search; reproductive; inductive; case method.
Forms of control	Pass/fail exam, exam
Required Resources	Personal computer; software; presentations; electronic resources; support cards; handouts.
Language of instruction	Russian, Kazakh
Post-requisites	Electrical equipment of industrial enterprises; Electrical installation; Life safety; Graduation project.

4.12 Specification of Professional Module 6 “Work on the elimination and prevention of accidents and malfunctions of electrical equipment, cable and overhead lines”

Scope of competence	Fulfillment of safety requirements
Module name	Perform work on the elimination and prevention of accidents and malfunctions of electrical equipment, cable and overhead lines
Purpose of the module	By the end of this module, the student will be able to perform work to eliminate and prevent accidents and malfunctions of electrical equipment, cable and overhead lines
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To carry out the choice of protection and electrics for power supply networks of an industrial enterprise. 2. To control the operation mode of the equipment of electric power industry facilities. 3. To carry out organizational measures to ensure safe operation
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Assembly of the switching circuits of the secondary windings of current transformers, voltage transformers. 2. Test of relay protection for high-voltage motor, step-down transformer, automatic switch-on reserve, automatic reclosing circuit. 3. Performance of diagnostics of electrical equipment, its units and systems and eliminate the simplest malfunctions and malfunctions. 4. Knowledge of methods for calculating and ensuring reliable lightning protection of power lines, power stations and substations, buildings and structures. 5. Ensuring the stable operation of low-voltage equipment of electrical power systems in conditions of internal overvoltage. 6. Identification of the types of major defects and electrical equipment malfunctions. 7. Identification and troubleshooting during the turnaround cycle and repair work. 8. Identification of the need for organizational and technical measures to improve the efficiency and operational reliability of electrical networks for

	<p>various purposes.</p> <p>9. Selection of operating mode, ensuring reliable operation of the equipment.</p> <p>10. Use of personal protective equipment when performing work.</p> <p>11. Ability to release the victim from the effects of electric current.</p> <p>12. Ability to instruct and complete acts H I.</p> <p>13. Performing methods of rendering first aid to victims.</p>
Prerequisites	Electric cars; Economic fundamentals; Economic theory.
Disciplines that form the module	<ul style="list-style-type: none"> - Relay protection and electric; - New technologies in the energy sector; - Labor protection; - Industrial training and / or professional practice (Industrial practice).
Module type (mandatory, optional)	Mandatory
Labor intensity (credits /academic hours)	12 credits / 360 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Teaching methods	Verbal (conversation, lecture); visual practical; problem search; reproductive; inductive; case method.
Forms of control	Pass/fail exam, exam
Required Resources	Personal computer; software; presentations; electronic resources; support cards; handouts.
Language of instruction	Russian, Kazakh
Post-requisites	Electrical networks and systems; Internship; Thesis.

4.13 Specification of the Professional Module 7 “Calculation of the effective use of enterprise resources”

Scope of competence	Organization and production of electrical equipment maintenance
Module name	Calculation of the effective use of enterprise resources
Purpose of the module	By the end of this module, the student will be able to perform calculations on the effective use of enterprise resources.
Level of professional qualification	4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To develop measures to improve economic efficiency and modernization. 2. To plan and manage the work of the personnel of the production unit. 3. To perform economic calculations for the preparation of feasibility studies and estimates of working projects.
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Cost estimate for the purchase and installation of electrical equipment. 2. Designing of documents on receipt of material assets from shop warehouses. 3. Carrying out activities to increase the service life of equipment, reduce its downtime and increase shifts, reduce labor intensity and cost of repairs, improve its quality. 4. Carrying out activities to study the best practices of domestic and foreign experience in operational and maintenance of equipment and its implementation. 5. Identification of the main stages of production planning. 6. Distribution of work according to the shift assignment. 7. Drawing up schemes of interdepartmental and intrashop electric networks. 8. Analysis of the existing equipment for moral and technical wear. 9. Scheduling preventive maintenance work on the repair cycle. 10. Management of a separate production unit within the functions assigned to specialists with secondary special education. 11. Management of a separate production unit

	<p>within the functions assigned to specialists with secondary special education.</p> <p>12. Identification of the norm of repair complexity of the installed equipment and the complexity of repairs.</p> <p>13. Calculation of the planned salary fund for the maintenance and repair of electrical facilities of the enterprise and the costs of operation and maintenance of equipment.</p> <p>14. Calculation of the estimated cost of capital costs in the implementation of equipment.</p> <p>15. Calculation of the efficiency ratio and the payback period of the equipment.</p>
Prerequisites	All basic and special modules
Disciplines that form the module	<ul style="list-style-type: none"> - Power supply network management; - Economy of the industry; - Industrial training and / or professional practice (Pre-diploma practice)
Module type (mandatory, optional)	Mandatory
Labor intensity (credits RK/academic hours)	14 credits / 420 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Teaching methods	Verbal (conversation, lecture); visual practical; problem search; reproductive; inductive; case method.
Forms of control	Pass/fail exam, exam
Required Resources	Personal Computer; software; presentations; electronic resources; support cards; handouts.
Language of instruction	Russian, Kazakh
Post-requisites	Diploma project

PLAN OF EDUCATIONAL PROCESS

Code and the education profile
Specialty
Qualification

0900000 – Energy
 0920000 - Low-Voltage Networks
 092001 3- Technician-Electrician

Form of training: Full-time
 Standard term of training: 3 years 10 months
 on the basis of the basic secondary education

Code module	The name cycles disciplines/modules, practices	Credit	Differential testing	Exam	The amount of training time (watches)					
					TOTAL	From them:				Distribution of semester
						Theoretical training	Practical training *	Industrial training	Individual training	
GED	General subjects	32	48	+	1448	1448				1-3
BM	Base modules	20		+	900	450	-	360	90	3-8
BM 1	The use of professional vocabulary, the preparation of business papers in the field of professional activity	3		+	135	90		30	15	3-8
BM 2	Application of the basics of philosophical knowledge, social sciences for socialization and adaptation in society and the workforce	5			225	180		30	15	3-8

BM 3	Understanding of the history, role and place of Kazakhstan in the world community, respectful and caring attitude to historical heritage and cultural traditions	3		+	135	90		30	15	3-8
BM 4	Application of basic knowledge of economics and knowledge of labor laws and regulations to protect their rights in their professional activities	3			135	45		60	30	3-8
BM 5	Development and improvement of physical qualities	4		+	180			180		3-8
BM 6	Performance, design, reading of design and technological documentation using application programs	2			90	45		30	15	3-8
PM	Professional modules on working qualifications (including industrial training and professional practice)	52		+	2340	585	1080	405	270	3-8
PM 1	Carrying out metalwork and assembly works	3		+	135	45	45		45	3-8
PM 3	Maintenance of shop electrical and electromechanical equipment	4		+	180	45	45	45	45	3-8
PM 4	Installation of electrical equipment, cable and overhead lines	8		+	360	90	180	90		3-8
PM 5	Repair of electrical and electromechanical equipment, cable and overhead lines	4		+	180	45	90	45		3-8
PM	Professional modules for mid-level specialist qualifications (including in-service training and professional	9		+	405	90	1 80	90	45	3-8

	practice)									
PM 2	Analysis of the operation of electrical installations and systems	8		+	360	90	180	45	45	3-8
PM 6	Work on the elimination and prevention of accidents and malfunctions of electrical equipment, cable and overhead lines	10		+	450	135	225	45	45	3-8
PM 7	Calculation of the effective use of enterprise resources	6		+	270	45	135	45	45	3-8
	Subtotal:	104			4688	2483	1080	765	360	
PP	Pre-diploma practice	8			360		360			
DP 01	Diploma project	8			360					
IC	Intermediate certification	2			90					
FC	Final certification	6			270	180			90	
	Total compulsory education	128			5768	3113	1440	765	450	
C	Consultation	8			370					
O	Optional classes	10			450					
	Total:	146			6588	3933	1440	765	450	

Note:

* 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 GCES, 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.

