

**MINISTRY OF LABOR AND SOCIAL PROTECTION OF
POPULATION OF THE REPUBLIC OF KAZAKHSTAN
PROJECT "DEVELOPMENT OF LABOR SKILLS AND JOB
STIMULATION"**

EDUCATIONAL PROGRAMME

0919000 - High Voltage Network

(code/code and the name of the specialty)

Level of professional qualification: applied bachelor's degree

Terms of training: 2 years 10 months.

Astana, 2018

The educational programme was reviewed and recommended by the Educational and Methodological Council (name of the organization of education)

Protocol No. 3 of «18» August 2018

Authors - developers:

1. Zhubandykova Zheniskul Umirtaevna – PhD., Associate Professor of the Department "Oil and Gas Business" of the RSE on PVC "Aktobe Regional State University named after K. Zhubanov";

2. Mukhanbetova Ryskul Zhaksylykovna - teacher of special disciplines of JSC "Aktyubinsk Polytechnic College"

3. Uteuliyev Erlan Baktybaevich - teacher of special disciplines of JSC "Aktyubinsk Polytechnic College"

4. Moldazhina Ayman Nurtayevna - teacher of special disciplines of the State Educational Establishment "Aktyubinsk Agricultural College"

5. Kurmanbaev Galymzhan Bekzuldaevich - the head of the electric section of the gas turbine power plant at the Kumkol field, JSC PetroKazakhstanKumkolRisorsiz

Experts:

Yusupov Sabit Teleshanovich - the head of the resource center, the teacher of special disciplines of KGKP "Ust-Kamenogorsk Polytechnic College"

CONTENT

	Introduction.....	5
1	Abbreviations and notations used	7
2	Passport EP	8
3	Competency profile	9
4	List of modules and learning outcomes.....	10
4.1	Module Specification BM 1 “Application of professional vocabulary, the preparation of business papers in the field of professional activity”	37
4.2	Module Specification BM 2 “Understanding of the history, role and place of Kazakhstan in the world community, respectful and caring attitude”	39
4.3	Module Specification BM 3 “Development and improvement of physical qualities”	41
4.4	Module Specification BM 4 “Application of the foundations of philosophical knowledge, social sciences for socialization and adaptation in society and the workforce”	43
4.5	Module Specification BM 5. “Application of basic knowledge of the economy and knowledge of labor laws and regulations to protect their rights in their professional activities”	45
4.6	Module Specification BM 6. “Preparation, design, reading of design and technological documentation using application programs”	46
4.7	Module Specification PM 1 "Installation of support for overhead power lines, contact networks and open switchgear structures"	48
4.8	Module Specification PM 2 "Installation and disassembly of wires, ground and tension cables of overhead power lines and contact networks"	50
4.9	Module Specification PM 3 "Maintenance of equipment of stations, distribution networks and systems"	52
4.10	Module Specification PM 4 "Repairing equipment of stations, distribution networks and systems"	54
4.11	Module Specification PM 5. "Performing diagnostic tests and measuring the parameters of the contact network devices and overhead power lines"	56
4.12	Module Specification PM 6 "Implementation of the commissioning of electrical equipment of medium and high voltage"	58
4.13	Module Specification PM 7 "Implementation of the commissioning of automatic devices"	60
4.14	Module Specification PM 8. "Performance of work on	62

	planning, organization and automation of production"	
4.15	Module Specification PM 9 "Performance of work to ensure safe operation of high-voltage equipment"	64
4.16	Module Specification PM10 "Conducting research and experimental work in the design of electrical networks and systems"	66
5	Plan of the educational process.....	68

Introduction

The present educational program for the specialty "0919000- High Voltage Networks" was developed in accordance with the State Obligatory Standard of Post-Secondary Education, approved by the Decree of the Government of the Republic of Kazakhstan No. 1080 of August 23, 2012; the national framework of qualifications of the Republic of Kazakhstan (joint order of the Minister of Labor and Social Protection of Population of the Republic of Kazakhstan of September 24, 2012 No. 373-o-m and the Minister of Education and Science of the Republic of Kazakhstan dated September 28, 2012 No. 444); the branch framework of qualifications in the field of "Electricity", approved by the protocol of November 17, 2016 No. 12-03-333; The project of the professional standard "Electrical equipment of power plants and networks (by types)" was developed by OYL "Kazakhstan Association of Oil and Gas and Energy Complexes" KAZENERGY", version 1, 2015, the date of the tentative revision of 2018 and taking into account the Order of the Minister of Education and Science of the Republic of Kazakhstan from 31 October 2017 № 553 "On the approval of standard curricula and model curricula for the specialties of technical and vocational education".

The program is designed to implement the principles of the democratic nature of education management, expand the boundaries of academic freedom and the authority of educational institutions, which 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 is aimed at training specialists able to conduct design and research and research activities at power facilities and electrical engineering. The emphasis of the educational program is on natural-science and electric-power training using information technologies, studying a wide range of disciplines, including the technology of production and transmission of electric energy, the calculation of modes of electrical devices, electrical networks, power supply systems, modern design automation tools, energy conservation issues.

The modular-competence approach is based on the development of learning and evaluation of learning outcomes in the form of competencies of students, as well as on the possibility of using a differentiated approach to learning.

The competency-based program is in line with the concept of lifelong learning, as it aims to build highly qualified professionals who are able to adapt to the changing situation in the world of work, on the one hand, and to continue professional growth and education on the other. This approach to learning makes it possible to create a sense of success for each student, which is created by the organization of the learning process, in which the student can and must manage his own training, which teaches him to take responsibility for his own training, and further - for his own professional growth and career . Thus, the consumer will be satisfied with the education, he can improve it during his life, responding to changes in the labor market.

The developed educational program allows organizing educational process with use of credit technology for training.

Based on this EP, the education organization develops working curricula and programs with the use of appropriate methodological recommendations for working training and planning documentation.

THE PASSPORT OF THE EDUCATIONAL PROGRAMME

Name (code and name of the specialty): 0919000 - **High Voltage Networks**

Title and qualification code «091901 3 Applied bachelor in High Voltage Network»

Purpose of the educational program: Preparation of a specialist of a new formation with broad fundamental knowledge, initiative, performing work on the organization and control of maintenance, operation, and repair of electrical equipment for high voltage networks.

Level of education: post-secondary education

Level of professional qualification: Applied Bachelor

Levels of qualifications for NRQF / SFQ:5

Sphere of professional activity *: Power engineering. Electrical power

Types of work (by SFQ and PS)**

- Electrical installation of electrical equipment of stations, substations, and networks
- Maintenance and repair of electrical equipment
- Operation of medium and high voltage electrical equipment with the introduction of automatic device systems
- Organization of work to ensure the uninterrupted operation of high-voltage electrical equipment
- Research and experimental activities in the design of electrical networks and systems

Objects of professional activity (by NCO, the initial group) *** Power plants, energy companies, production workshops, equipment repair areas

Features of the program **:** Ability to use the dual form of training, credit training system.

Education form: full-time.

Terms of training: 2 years 10 months

Language of instruction: Kazakh / Russian

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

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

* It is indicated by the parameters of the SFQ (Methodological recommendations for the development and design of the branch framework ** To be indicated on the PS (Methodological recommendations on development and registration of professional standards, Astana, 2017)

*** The systems, objects, phenomena, processes, technologies for which, activity is directed, are indicated.

**** Identifies dual education / distance learning / credit technology

***** The previous education is indicated: basic secondary/general secondary/technical and vocational education

COMPETENCE PROFILE

<p>Purpose of training: performance of work on the organization and control of maintenance, operation, and repair of electrical equipment of high voltage networks</p>	<p>Result: after completion of the training program, the trainee will be able to perform work on the organization and control of maintenance, operation, and repair of electrical equipment of high voltage networks</p>	
<p>The names of the section, section, group, class, and subclass according to GSEA * (by PS)</p>	<p>Section D: Power supply, gas, steam and air conditioning</p> <p>Section [35]: Power supply, gas supply, steam and air conditioning</p> <p>Group [351]: Electricity production, transmission, and distribution:</p> <p>Class [3512]: Transmission of electricity</p>	
<p>Areas of competence (<i>on the basic labor functions of the professional standard or the analysis of the profession</i>) **</p>	<p>A. Electrical installation of electrical equipment of the station, substation, and networks</p> <p>B. Maintenance and repair of electrical equipment</p> <p>C. Operation of electrical equipment of medium and high voltage with the input of systems of automatic devices</p> <p>D. Organization of works to ensure the uninterrupted operation of high-voltage electrical equipment</p>	
<p>List of competences and modules in the context of the academic degree / qualification / profession</p>		
<p>Competency code</p>	<p>Competencies (in line with the labor functions)</p>	<p>Modules</p>
<p>Basic competencies</p>		
<p>PC 1</p>	<p>To perform the installation of supports of overhead transmission lines, contact networks and structures of open distribution devices</p>	<p>PM 1 Installation of supports of overhead power lines, contact networks and structures of open distribution devices</p>

PC 2	To carry out installation and dismantling of wires, lightning protection and tension cables of overhead transmission lines and contact networks	PM 2 Installation and dismantling of wires, lightning protection and tension cables of overhead transmission lines and contact networks
PC 3	To perform work on diagnostic tests and measurements of parameters of devices of the contact network and overhead power lines	PM 3 Performance of works on diagnostic tests and measurements of parameters of devices of the contact network and overhead power lines
PC 4	To carry out maintenance of equipment of stations, distribution systems and networks	PM 4 Maintenance of equipment of stations, distribution networks, and systems
PC 5	To repair equipment of stations, distribution systems, and networks	PM 5 Repair of equipment of stations, distribution networks, and systems
PC 6	To commission the electrical equipment of medium and high voltage	PM 6 Implementation of commissioning of medium and high voltage electrical equipment
PC 7	To commission automatic devices	PM 7 Commissioning of automatic devices
PC 8	To carry out work on planning, organization, and automation of production	PM 8 Performance of works on planning, organization, and automation of production
PC 9	Perform work to ensure the safe operation of high-voltage equipment	PM 9 Performing work to ensure the safe operation of high-voltage equipment
PC10	To conduct research and experimental work in the design of electrical networks and systems	PM 10 Conducting research and experimental work in the design of electrical networks and systems
Basic competencies		
BC 1	To apply professional vocabulary, compose and execute business documents in the field of activity for solving problems of interpersonal and intercultural interaction	BM 01 Application of professional vocabulary, drafting of business papers in the sphere of professional activity
BC 2	To understand the history, role and place of	BM 02. Understanding the history, role and place of Kazakhstan

	Kazakhstan in the world community	in the world community, respectful and caring attitude to historical heritage and cultural traditions
BC 3	To maintain and develop an adequate level of physical fitness to ensure the full social and professional activities	BM 03. Development and improvement of physical qualities
BC 4	To use the basics of philosophical knowledge, be aware of oneself and one's place in society, tolerate the social, political, ethnic, confessional and cultural development	BM 04. Application of the fundamentals of philosophical knowledge and social sciences for socialization and adaptation in society and work collective
BC 5	To understand the basic laws and mechanisms of the functioning of the modern economic system	BM 05. Application basic knowledge of the economy and knowledge of labor law and regulations to protect their rights in their professional activities
BC 6	Perform sketches, diagrams and drawings, read the technological documentation, use the application packages of the development of design and technological documentation	Performance, design, read the design and technological documentation using the application programs

* The general classifier of economic activities (OKED) is a document intended for the classification and coding of all types of economic activity.

** A brief description of the work functions that enable you to achieve the main purpose of the specialty/profession. The number of functions depends on the complexity of the profession.

LIST OF MODULES AND LEARNING OUTCOMES

Module name	Learning outcomes (in accordance with professional tasks)	Criteria for evaluation	Disciplines that form modules
Professional modules			
<p>PM 1. Installation of support for overhead power lines, contact networks and open switchgear structures</p>	<p>LO 1 To prepare the supports of overhead power lines and structures of open distribution devices for assembly and installation</p>	1. Characteristics of power systems and power grids	Engineering graphics
		2. Classification of power plants and types of installation works	Theoretical mechanics
		3. Characteristics of the installation of overhead transmission lines and the designation of structural elements	Theoretical foundations of electrical engineering
		4. Knowledge of ways to construct overhead transmission lines	Electric cars
		5. Carrying out preparatory work for the construction of overhead transmission lines and a contact network	Electrotechnical materials
		6. Preparation of support of overhead power lines and structures of open distribution devices for assembly and installation	Industrial electronics
			Information and communication technology
			Theoretical bases of installation and dismantling of wires and cables
			Theoretical bases of mounting supports and

	LO 2. To assemble the supports of overhead power lines and structures of open switchgears	1. Preparation and use of technical documentation for the installation of high voltage overhead lines	structures Mechanic-mechanical practice
		2. Purpose and content of technical documentation, requirements for its design	Electrical practice
		3. Execution of antiseptic parts of wooden supports and waterproofing of reinforced concrete structures	
		4. Painting of unidentified supports and structures of open substations;	
	LO 3. To install the supports of overhead power lines and structures of open distribution devices.	1. Installation and dismantling of supports and structures of open substations	
		2. Perform editing power transmission lines	
		3. Painting the installed supports and structures of open substations	
		4. The numbering of supports, fixing tables and posters on them	
		5. Installation of overhead power line supports and open switchgear structures	
	LO 4. To	1. Knowledge	

	read the drawings and diagrams	of the basic rules for the development, design, and reading of design and technological	
		2. Application basic techniques of drawing techniques, rules for the implementation of drawings	
		3. Meeting the requirements of a unified system of design documentation (USDD)	
		4. Reading of drawings of products, mechanisms and units of the equipment used	
PM 2 Installation and dismantling of wires, ground and tension cables of overhead power lines and contact networks	LO 1. To roll and reel the steel ropes, cables, and wires	1. Roll-out of steel ropes, wires, and cables with the installation of drums	
		2. Winding on drums of wires and cables	
		3. Performing the reaming of drums with coiled wires and ropes	
	LO 2. To assemble insulators and fittings in insulating pendants	1. Abidance of safety in work	
		2. Assembling insulators in insulating pendants	
		3. Assembling insulators in insulating pendants	
	LO 3. To	1. Carrying	

	<p>carry out earthing and zeroing of lightning and tension cables of overhead transmission lines and contact networks</p>	<p>out of the installation of grounding and zeroing of overhead power lines and contact networks;</p>	
	<p>LO 4. To pull and dismantle cables to the supports of overhead power lines and contact networks</p>	<p>2. Deepening of earthing switches manually and with the help of mechanized tools</p>	
	<p>LO 5. To install and dismantle wires and</p>	<p>3. Coloring of details of fastening consoles and grounding tires</p>	
		<p>1. Lifting the wire to the supports of overhead power lines</p>	
		<p>2. Conducting cutting and felling of wires and cables</p>	
		<p>3. Production of descents, jumpers, loops and half loops from wires and cables</p>	
		<p>4. Perform unwinding and installation of chain and plastic strings on a carrying cable from the ground, arresters</p>	
		<p>5. Installation of protection for transitions, armature on consoles and crossbars, restraints of compensated anchoring, fixation and feeder brackets on supports</p>	
		<p>1. The installation of the middle anchorage on</p>	

	networks	the ground, suspension of the supporting cable from the ground to the supports, insulating insulators in the wires and cables on the ground	
		2. Installation between rail connections, wires on overhead power lines	
		3. Fabrication and connection of cable delays to the supports, complete set of rigid crossbars	
		4. Carrying out of dismantling of wires and cables of overhead power lines	
		5. Installation of airline inputs into buildings and fastening of wires on pin insulators	
		6. Implementation of tension and adjustment of wires and cables on overhead power lines	
		7. Selection of materials based on their properties for use in the installation of high voltage overhead power lines and contact networks	
PM 3 Carrying out maintenance of equipment of stations,	LO 1. To conduct maintenance of electrical equipment	1. Characteristics and principle of operation of electrical equipment	Electrical equipment of power stations and substations

distribution networks and systems		2. Defining of the equipment performance	Operation of electrical equipment of power plants and substations
		3. Identification of damage and assessment of the technical condition of electrical equipment	
		4. Ensuring uninterrupted work of electrical equipment of stations, networks	
		5. Performance of switching	
	LO 2. To conduct preventive electrical inspections	1. Knowledge of safe methods of work on electrical equipment	
		2. Defining of the technical condition of electrical equipment	
		3. Inspection, determination and elimination of defects and damage to electrical equipment	
		4. Registration of technical documentation in the process of maintenance of electrical equipment	
	LO 3.To perform adjustment and testing of electrical equipment.	1. Compliance with the timing of the test of protective equipment and devices	
		2. Testing and commissioning of electrical equipment	

		3. Restoration of power supply to consumers	
		4. Preparation of technical reports on the maintenance of electrical equipment	
PM 4 Repair of station equipment, distribution networks and systems	LO 1. To perform repair of stations, distribution networks and systems	1. Implementation of monitoring compliance with safety measures and quality of repair work	Organizat ion of installation, repair and adjustment of high-voltage equipment Electrical apparatus
		2. Defining of the health and maintainability of equipment withdrawn from work	
		3. Identification of the causes and methods of eliminating the danger to personnel performing repair work.	
		4. Preparation of applications for equipment and spare parts and the preparation of technical documentation for repairs	
		5. Execution of repair work	
	LO 2. To rent and take electrical equipment from repair	1. Testing of repaired electrical equipment	
		2. Use of devices, tools, equipment and	

		measuring instruments	
		3. Analysis of the causes of contactors wear and ways to combat this phenomenon.	
		4. Performance of commissioning works.	
		5. Calculation of the parameters of electrical apparatus and the preparation of design documentation	
		6. Acceptance of electrical equipment after repair	
PM 5. Performing diagnostic tests and measurements of parameters of contact network devices and overhead power lines	LO 1. To perform preparatory work for the performance of diagnostic tests and measurements of parameters of the contact network devices and overhead power lines	1. Familiarization with the order of work and the peculiarities of the technological operations for diagnostic testing and measuring the parameters of the contact network devices and overhead power lines	
		2. Selection of instruments, tools, protection and installation tools for the production of diagnostic tests and measurements of parameters of the contact network devices and overhead power lines based on the task	

		<p>3. Testing the health of protective and installation tools, diagnostic devices and tools</p>	
		<p>4. Preparation and commissioning of instruments for performing diagnostic tests and measurements of parameters of a contact network device and overhead power lines</p>	
		<p>5. Preparation of the workplace by de-energizing and fencing signals</p>	
	<p>LO 2. To perform work on the inspection and diagnosis of contact network devices and overhead power lines</p>	<p>1. Assessment of the condition of the serviced equipment during the inspection and diagnostics of the contact network devices and overhead power lines</p>	
		<p>2. Inspection of the contact network devices, overhead power lines, transitions of power lines through the contact network</p>	
		<p>3. Carrying out diagnostics of the contact network devices and overhead power lines on the supports of the contact network from the railcar</p>	
		<p>4. Identifying</p>	

		the causes of malfunction of power supply devices	
		5. Defining the volume of repair work on the results of the audit, detours and detours with inspections of the contact network and overhead power lines	
		6. Examination and diagnostics of the contact network devices and overhead power lines, including the use of automated systems installed at the workplace	
	LO 3.To perform work on testing and measuring devices of the contact network using portable and stationary diagnostic equipment	1. Assessment of the condition of the serviced equipment of the contact network and other power supply devices	
		2. Testing and measuring the parameters and dimensions of the contact network and other power supply devices	
		3. Analysis of the measurements made during the work on testing and measuring devices of the contact network	
		4. Determination of the volume of repair work on the results of	

		tests and measurements of the contact network and other power supply devices	
		5. Maintenance of technical documentation on the results of tests and measurements of the contact network and other power supply devices, including using automated systems installed at the workplace	
<p>PM 6 Implementation of commissioning of medium and high voltage electrical equipment</p>	<p>LO 1. To apply the basic methods and means of measuring electrical and electrical quantities, choose measuring equipment</p>	1. Drawing up measuring circuits	<p>Informati on and measuring equipment</p> <p>Electrom agnetic Transients</p>
		2. Selection of measuring instruments	
		3. Measurement with a given accuracy various electrical values	
		4. Determination of the value of the measured value and measurement accuracy	
		5. Application of computer technology for processing and analyzing measurement results	
	<p>LO 2. To analyze electromagnetic transients in electric power systems</p>	1. Application of methods for calculating transient and steady-state processes in linear and nonlinear	

		electrical circuits	
		2. Analysis of operating modes of electric power and electrical equipment and systems	
		3. Calculation of the parameters of electrical power and electrical devices, electrical installations, electrical power networks and systems, power supply systems	
		4. The use of applied programs and computer-aided design tools when solving engineering problems	
PM 7 Implementation of the commissioning of automatic devices	LO 1. To carry out the development and evaluation of algorithms for the operation and interaction of various automation devices for electric power devices	1. Knowledge of the principles of relay protection and automatic control systems in the power industry	Automatic control in power engineering
		2. Characteristics of methods for adjusting the parameters of the mode of electric power systems	Fundamentals of relay protection technology
		3. Selection of types of relays and methods for controlling parameters of relay protection and automation	High voltage technique
		4. Application of automatic reclosing and	

		automatic switching on schemes	
	LO 2.To perform protection and adjustment of various automation devices of electric power devices.	1. Reading relay protection and automation schemes for electric power devices	
		2. Analysis of relay protection circuits of power lines, transformers, compensators, electric motors, busbars, blocks	
		3. Performance of adjustment of emergency protection automation	
	LO 3. To analyze the structures and processes that accompany the operation of high-voltage installations	1. Characteristics of the main causes of emergency conditions caused by exposure to strong electric fields and electric discharge processes	
		2. Understanding of electrophysical processes in dielectric media	
		3. Isolation classification of high-voltage equipment	
		4. Proficiency in measuring high voltages	
		5. The use of surge protection	
PM 8 Planning, organization and automation of	LO 1. To understand the essence of market reforms	1. Awareness of the management structure of enterprises	Energy Economics Labor

production		2. Knowledge of the basics of planning	protection and electrical safety
		3. Understanding the development of the economy of the Republic of Kazakhstan	
	LO 2. To apply the results of economic analysis of industry and energy organizations	1. Analysis of the effectiveness of planning	
		2. Calculation of investment in capital construction	
		3. Performing calculations of technical and economic indicators	
4. Implementation of design and settlement work			
PM 9 Performing work to ensure the safe operation of high-voltage equipment	LO 1. Comply with the requirements of safety and labor protection when servicing electrical installations	1. Application of the main tasks and legal bases of protection, rules of fire safety and industrial sanitation of labor	
		2. Compliance with safety regulations when servicing electrical installations	
		3. Selection of a safe working method and means of protection when inspecting electrical equipment	
		4. Analysis of the results of the inspection and the	

		question of the health of electrical equipment on external signs	
	LO 2. To carry out organizational measures to ensure the safe operation of high-voltage equipment	1. Registration of work in order, order or list of works performed in the order of current operation	
		2. Issuance of permits for the preparation of the workplace and for admission to work with the requirements	
		3. Registration of the admission to work and performance of supervision in operating time	
		4. Making a break in work, transfer to another place, end of work	
	LO 3. To carry out technical measures to ensure the safe operation of high-voltage equipment	1. Conducting power off	
		2. Adoption of measures that prevent the erroneous or spontaneous switching on of switching equipment	
		3. Perform a no-voltage test, overlay ground connections.	
PM 10 Conducting research and experimental work in the design of electrical	LO 1.To analyze the stability and optimization of modes of electric power systems	1. Solution by means of a mathematical method, Calculation the normal modes of power systems	Mathematical problems and computer modeling in power engineering

networks and systems		2. Conducting a study of statistical and dynamic stability	Basics of computer-aided design (AUTOCAD and CREDO) Electrical networks and systems Fundamentals of research work Undergraduate practice
		3. Study of steady state equations	
		4. Processing and analysis of the results	
	LO 2.To apply modern software and hardware design tools to solve automation and control problems	1. Knowledge of the main tools and methods of computer-aided design	
		2. Application of computer-aided design tools to solve typical problems of analysis and synthesis of control systems	
		3. Knowledge of computer-aided design techniques.	
		4. Use of design software	
	LO 3. To calculate and design electrical networks	1. Carrying out technical and economic calculations in the electrical networks of the system	
		2. Application to calculate the modes of electrical systems and computer EC networks	
		3. Evaluation of the possibility of ensuring the quality of electricity in the projected network	
		4. Preparation	

		of a project to optimize the operation of electrical networks and systems	
Basic Modules			
BM 1 Application of professional vocabulary, preparation of business documents in the sphere 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. Reading and translation (with a dictionary) of professional texts. Understanding of the discussion topics and participation in its discussion.	Professionally-oriented foreign language Professional Kazakh (Russian) language
		2. Independent preparation of coherent, logical reasoned statements in accordance with the proposed topic.	
		3. Understanding of the discussion topics and participation in its discussion.	
	LO2. To know the translation technique (with a dictionary) of professional-oriented texts	1. Reading and translation (with a dictionary) of professional texts	
		2. Independent preparation of coherent, logical reasoned statements in accordance with the proposed topic.	
		3. Understanding of the discussion topics and participation in its discussion.	
LO3. To work with organizational, administrative,	1. Drawing up in Kazakh (Russian) and foreign languages a resume,		

	information and reference documents using computer technologies	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 science, technology and technology Understanding the essence of social and ethical problems associated with the development and use of science, technology and technology.	Fundamentals of Philosophy, Fundamentals of Sociology and Political Science
		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	
	LO 2. To understand international political processes, geopolitical situation	1. Using of political science knowledge in everyday life and in their professional activities	
		2. Participation in discussions on current issues, problems and prospects for development, etc.	
		3. Using of social, moral and legal norms governing the attitude of a person towards a person, society, environment	
	LO 3. 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. Using of approaches and methods of critical analysis in relation to various cultural forms and processes of modern society	
		3. Application of national traditions and customs of	

		various countries in professional activities	
<p>BM 3. Understanding the history, the role and place of Kazakhstan in the world community, respectful and caring attitude to historical heritage and cultural traditions</p>	<p>LO 1.To understand the role and place of culture of the peoples of the Republic of Kazakhstan in world civilization</p>	<p>1. Knowledge of the foundations of the history of national culture, the values of traditional Kazakh culture</p>	<p>Modern history of Kazakhstan</p> <p>Cultrology</p>
		<p>2. Understanding the role and place of culture of the peoples of the Republic of Kazakhstan in world civilization</p>	
		<p>3. Characteristics of the cultural achievements of independent Kazakhstan</p>	
	<p>LO 2. To understand the moral values and norms that form tolerance and an active personal position.</p>	<p>1. Characteristics of the forms, types and history of different cultures and civilizations</p>	
		<p>2. Understanding the current state of the world and traditional religions</p>	
		<p>3. Tolerant perception of social, ethnic, confessional and cultural differences.</p>	
	<p>LO 3. To understand the main historical events</p>	<p>1. Understanding the essence of historical events that occurred from antiquity to the</p>	

		present.	
		2. Disclosure of 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	
		3. Understanding the nature and purpose of the political and social changes taking place in the Republic of Kazakhstan after independence	
		4. Characteristics of the achievement of an independent Kazakhstan	
	LO 4. To determine causal relationships of historical events.	1. Definition of the basic facts, processes and phenomena, reflecting and characterizing the integrity and consistency of the history of Kazakhstan	
		2. Establishing the connection between historical events	
		3. Using historical sources	

<p>BM 4. Applying basic knowledge of the economy and knowledge of labor laws and regulations to protect their rights in professional activities</p>	<p>LO 1. To identify the forms and types of property, types of plans, the main economic indicators of the enterprise</p>	<p>1. Fulfillment of necessary economic calculations using mathematical methods</p>	<p>Fundamentals of Economics Law basics</p>
		<p>2. Discussion of the main economic indicators of the enterprise</p>	
		<p>3. Carrying out of measurements of working time expenses for the performance of a certain work</p>	
		<p>4. Determining methods to reduce costs and improve profitability</p>	
	<p>LO 2. To understand the development trends of the world economy, the main tasks of the state transition to a "green" economy</p>	<p>1. Understanding of the main tasks of the state transition to a "green" economy</p>	
		<p>2. Application of basic methods of calculating gross domestic product and gross national product</p>	
		<p>3. Definition of global economic problems, ways to overcome them</p>	
	<p>LO 3. To protect your rights in accordance with labor law</p>	<p>1. Understanding the legal status in the formation of a person's identity in accordance with the provisions of the Constitution of the</p>	

		<p>Republic of Kazakhstan</p> <p>2. Use of evidence-based arguments of one's own position in specific legal situations using normative acts</p> <p>3. Understanding responsibility for administrative and corruption offenses</p>	
	<p>LO 4. To master the basic concepts of law and state-legal phenomena</p>	<p>1. Knowledge of concepts and observance of principles of legality and law and order</p> <p>2. Use of evidence-based arguments of one's own position in specific legal situations using normative acts</p> <p>3. Understanding responsibility for administrative and corruption offenses</p>	
<p>BM 5. Development and improvement of physical qualities</p>	<p>LO 1. To strengthen health and respect the principles of a healthy lifestyle</p>	<p>1. Understanding the Importance of Physical Culture for Health Promotion, the Role of Physical Culture and Sport in Country Development</p> <p>2. Implementation of a set of exercises for</p>	<p>Physical Culture</p>

		general physical training	
		3. Applying the rule of a healthy lifestyle in everyday life	
	LO 2. To improve physical qualities and psychophysiological abilities	1. Knowledge of the technique of the exercise	
		2. Compliance with the rules of team sports games	
		3. Compliance with the rules of team sports games	
		4. Performance 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, ways to prevent injuries	
		2. Provision of pre-medical care for injuries	
		3. Assessment of the difficulty and risk arising during the execution of various physical exertions own and other physical abilities	
BM6. Execution, execution, reading of design and	LO1. To follow the rules of design documentation	1. Understanding the rules for design documentation.	Engineering graphics. Computer design.

technological documentation using application programs		2. Design drawings according to the rules of a single system of design documentation.
		3. Definition of the purpose and scale of the drawing technical details.
		4. Compliance with the requirements of the unified system of design documentation (ESKD).
	LO2. To have skills of projecting on the plane	1. Execution and design of the necessary cuts in the drawings.
		2. Perform axonometric projection.
		3. Drawings of schemes according to symbols according to a single 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	1. Performance of specialty schemes using technical drawing tools.
		2. Application of modern software applications.
		3. Computer graphics, 3D graphics.

Specification of the basic module 1
«Application of professional vocabulary, drafting of business papers in the sphere of professional activity»

Scope of competence	Drawing up and preparation of business documents in the field of activity, knowledge of professionally-oriented languages
Module name and code	BM 1. Application of professional vocabulary, the preparation of business papers in the field of professional activity.
Purpose of the module	Formation and development of communicative speech competence of students, improving the speech culture of future specialists and promptly carry out tasks and competently issuing of official business papers.
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 know the translation technique (with a dictionary) of professional-oriented texts 3. To work with organizational, administrative, information and reference documents using computer technologies.
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Basics of business Kazakh (Russian) and foreign language and professional vocabulary 2. Rules of speech etiquette 3. Participation in a professional conversation 4. Basics of office work 5. Methods of creation and functions, classification, carriers, purpose, components, component parts, rules for processing documents 6. Knowledge of the lexical and grammatical minimum of the Kazakh (Russian) and foreign language, necessary for reading and translating (with a dictionary) professional texts 7. Knowledge of national culture, business culture of the country 8. Drawing up of official documents

	necessary in professional activities with the use of computer technology.
Prerequisites	School program: Kazakh (Russian) language, Foreign language
Disciplines forming the module	Professional Kazakh (Russian) language Professional foreign language, professionally-oriented 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	1-5
Form of training	Full-time
Teaching methods	lecture, practical classes, problematic Teaching methods, interactive Teaching methods
Forms of control	Pass/fail exam, exam
Required resources	Library fund, Internet classes, standard educational, electronic and educational resources (language labs)
Language of instruction	Russian/ Kazakh
Post-requisitioning	PM 1 – PM 9 Professional modules

Specification of the basic module 2 «Application of the basics of philosophical knowledge, social sciences for socialization and adaptation in society and the work collective»

Scope of competence	Basics of philosophy, awareness of oneself and one's place in society, tolerant perception of social and political differences
Module name and code	Application of the basics of philosophical knowledge, social sciences for socialization and adaptation in society and the workforce
Purpose of the module	Formation of students' system of knowledge about the political, legal and socio-spiritual foundations of the functioning and development of society
Level of professional qualification	5
Learning outcomes by module	<ol style="list-style-type: none"> 1. To determine the correlation in a person's life of such philosophical categories as freedom and responsibility, material and spiritual values 2. To understand international political processes, the geopolitical situation 3. To understand moral values and norms that form tolerance and an active personal position
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Basics of studying the philosophical picture of the world 2. Understanding patterns and prospects for the development of society 3. Trends in the development of socio-political processes of the modern world 4. Basic concepts and patterns of philosophy 5. Functioning of the system of relations between citizens and other political actors in society 6. Operation of the basic philosophical concepts 7. Basic questions of philosophy and laws of dialectics 8. Systems of social and political relations taking shape in the course of social interaction.

Prerequisites	School Program: History, Man, and Society, Literature, Geography
Disciplines forming the module	Fundamentals of philosophy Fundamentals of Sociology and Political Science
Module type (mandatory, optional)	Mandatory
Labor intensity (credits / academic hours)	6 credits/ 180 hours
Duration of the module	1-3
Form of training	Full-time
Teaching methods	Traditional Teaching methods - lecture, practical classes, problematic Teaching methods, interactive teaching methods
Forms of control	Pass/fail exam
Required resources	Library fund, Internet classes, standard educational, electronic and educational resources
Language of instruction	Russian/ Kazakh
Post-requisitioning	Modern History of Kazakhstan, Culturology, Basics of Economics

Specification of the basic module 3
«Understanding of the history, role, and place of Kazakhstan in the world community, respectful and careful attitude to historical heritage and cultural traditions»

Scope of competence	The history, role, and place of Kazakhstan in the world community
Module name and code	Understanding of the history, role, and place of Kazakhstan in the world community, respectful and careful attitude to historical heritage and cultural traditions
Purpose of the module	Show scientifically proven facts, continuities, and sequences of historical and cultural development from ancient eras to today
Level of professional qualification	5
Learning outcomes by module	<ol style="list-style-type: none"> 1. To understand the role and place of a culture of the peoples of the Republic of Kazakhstan in the world civilization 2. To understand moral and moral values and norms that form tolerance and an active personal position 3. To understand the main historical events 4. To determine the cause-effect relations of historical events
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. The essence and purpose of culture 2. The essence and regularities of historical events that took place from antiquity to the present time 3. Basic concepts and patterns of culture, religion, and civilization 4. Chronological boundaries and essence of the main historical periods of Kazakhstan 5. The role and place of the culture of the peoples of the Republic of Kazakhstan in the world civilization 6. Fundamentals of universal moral values and humanistic outlook
Prerequisites	School Program: History, Man, and Society, Fundamentals of Law
Disciplines forming the	The modern history of Kazakhstan,

module	Culturology
Module type (mandatory, optional)	Mandatory
Labor intensity (credits / academic hours)	4 credit/ 120 hours
Duration of the module	1-2
Form of training	Full-time
Teaching methods	Traditional Teaching methods - lecture, practical classes, problematic Teaching methods, interactive Teaching methods
Forms of control	Pass/fail exam, exam
Required resources	Library fund, Internet classes, electronic and educational resources
Language of instruction	Russian/ Kazakh
Post-requisitioning	Fundamentals of Philosophy, Fundamentals of Sociology and Political Science

Specification of the basic module 4
«Application of the basic knowledge of the economy and knowledge of labor laws and regulations to protect their rights in professional activities»

Scope of competence	Modern economic system
Module name and code	Application of the basic knowledge of the economy and knowledge of labor laws and regulations to protect their rights in professional activities
Purpose of the module	To familiarize with the basic theoretical positions of economic activity of the power enterprise in the conditions of the market economy, the basic economic categories and concepts, the existing system of economic indicators and methods for their calculation
Level of professional qualification	5
Learning outcomes by module	<ol style="list-style-type: none"> 1. To identify 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 tasks of the state transition to a "green" economy 3. To protect rights in accordance with labor legislation 4. To know the basic concepts of law and state and legal phenomena
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Fundamentals of the economic theory 2. General fundamentals of economic systems 3. The fundamentals of macroeconomics 4. Actual problems of the economy 5. Main tasks of the Green Economy 6. System of state-legal relations and phenomena functioning of the system of relations between citizens and other subjects of politics in the society 7. Conceptual provisions of the theory of economics and business fundamentals 8. Priority directions of social and economic development of the country

Prerequisites	School Program: Man and Society, Fundamentals of Law, Geography
Disciplines forming the module	Fundamentals of Economics Law basics
Module type (mandatory, optional)	Mandatory
Labor intensity (credits / academic hours)	4 credit/120 hours
Duration of the module	1-2
Form of training	Full-time
Teaching methods	Traditional Teaching methods - lecture, practical classes, problem-solving teaching methods, interactive teaching methods
Forms of control	Pass/fail exam
Required resources	Library fund, Internet classes, standard educational, electronic and educational resources
Language of instruction	Russian/ Kazakh
Post-requisitioning	Fundamentals of Philosophy, Labor Law of the Republic of Kazakhstan, Family Law of the Republic of Kazakhstan

Specification of the basic module 5
«Development and improvement of physical qualities»

Scope of competence	Physical Culture and Sport
Module name and code	Development and improvement of physical qualities
Purpose of the module	Formation of physical culture of pupils and abilities to realize it in social-professional, physical culture and sports activity
Level of professional qualification	5
Learning outcomes by module	<ol style="list-style-type: none"> 1. To promote 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. Socio-biological and psychophysiological foundations of physical culture 2. Fundamentals of physical and sport self-improvement 3. Basics of a healthy lifestyle
Prerequisites	Knowledge of the school course physical culture
Disciplines forming the module	Physical Culture
Module type (mandatory, optional)	Mandatory
Labor intensity (credits / academic hours)	6 credits/ 180 hours
Duration of the module	1-6
Form of training	Full-time
Teaching methods	Practical work
Forms of control	Pass/fail exam, exam
Required resources	Sports hall and sports inventory
Language of instruction	Russian/ Kazakh
Post-requisitioning	Groups of sports for perfection

Specification of the basic module 6
«Performance, design and reading of design and technological
documentation by means of application programs»

Scope of competence	-
Module name and code	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	5
Learning outcomes by module	<ol style="list-style-type: none"> 1. To follow the rules of design documentation. 2. To have skills of projecting on the plane. 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. Understanding the rules for design documentation. 2. Design drawings according to the rules of a single system of design documentation. 3. Definition of the purpose and scale of the drawing technical details. 4. Compliance with the requirements of the unified system of design documentation (USDD). 5. Execution and registration of the necessary cuts on the drawings. 6. Performance of axonometric projection. 7. Execution of drawings of schemes according to symbols according to a single system of design documentation. 8. Application of computer graphics techniques. 9. Implementation of schemes in

	<p>the specialty, using the means of technical drawing.</p> <p>10. Application of modern software applications.</p> <p>11. Knowledge of computer graphics, the use of 3D-graphics.</p>
Prerequisites	Mathematics, geometry and stereometry of the school program; Computer science; Object Oriented Programming.
Disciplines forming the module	<ul style="list-style-type: none"> - Engineering graphics; - Computer design.
Module type (mandatory, optional)	Mandatory / Optional
Labor intensity (credits / academic hours)	4 credit/ 120 hours
Duration of the module	1 semester
Form of training	Pass/fail exam
Learning technology	Modular
Teaching methods	Verbal (conversation, lecture); visual practical; problem search; reproductive; inductive; case method
Forms of control	Oral / written questioning; cards; independent work; practical / laboratory work; test tasks; test; creative assignments; case assignments; pass/fail exam / exam
Required resources	Personal Computer; software; presentations; electronic resources; support cards; handouts.
Language of instruction	Russian, Kazakh
Post-requisitioning	Basics of computer simulation.

Specification of the professional module1
«Installation of supports of overhead power lines, contact networks and structures of open distribution devices»

Scope of competence	Electric installation work
Module name and code	Installation of supports of overhead power lines, contact networks and structures of open distribution devices
Purpose of the module	To teach students to conduct electric installation work on the overhead line
Level of professional qualification	5
Learning outcomes by module	<ol style="list-style-type: none"> 1 To perform preparation of overhead power line supports and open switchgear structures for assembly and installation 2. To assemble the supports of overhead power lines and structures of open switchgears 3. To perform the installation of overhead power line supports and open switchgear structures 4. To read the drawings and diagrams
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Characteristics of power systems and power grids 2. Classification of power plants and types of installation work 3. Characteristics of the device overhead power lines and the appointment of structural elements 4. Methods of construction of overhead power lines 5. Purpose and content of technical documentation, requirements for its design 6. Basic rules for the development, design and reading of design and technological documentation 7. Basic techniques of drawing, rules for the implementation of drawings 8. Requirements of the unified system of design documentation (USDD)
Prerequisites	<ol style="list-style-type: none"> 1. Fundamentals of the specialty 2. General energy
Disciplines forming the module	Engineering graphics Theoretical mechanics

	<p>Theoretical foundations of electrical engineering</p> <p>Electric cars</p> <p>Electrotechnical materials</p> <p>Industrial Electronics</p> <p>Information and communication technology</p> <p>Theoretical bases of installation and dismantling of wires and cables</p> <p>Theoretical bases of mounting supports and structures</p> <p>Mechanic-mechanical practice</p> <p>Electrical practice</p>
Module type (mandatory, optional)	Mandatory
Labor intensity (credits / academic hours)	10 credits/ 300 hours
Duration of the module	
Form of training	Full-time
Teaching methods	Traditional Teaching methods - lecture, practical and laboratory classes, problematic Teaching methods, interactive Teaching methods.
Forms of control	Pass/fail exam, exam
Required resources	Library fund, Internet classes, standard educational, laboratory equipment, workshops, practical bases, electronic and educational resources
Language of instruction	Russian/ Kazakh
Post-requisitioning	<p>Electrical equipment of power stations and substations</p> <p>Operation of electrical equipment of power plants and substations</p> <p>Organization of installation, repair and adjustment of high-voltage equipment</p> <p>Electrical apparatus</p> <p>Industrial training</p>

Specification of the professional module2

«Installation and dismantling of wires, lightning protection and tension cables of overhead transmission lines and contact networks»

Scope of competence	Electric installation work
Module name and code	Installation and dismantling of wires, ground and tension cables of overhead power lines and contact networks
Purpose of the module	After studying the module, the student will be able to carry out the installation and disassembly of wires, ground and tension cables of overhead power lines and contact networks
Level of professional qualification	5
Learning outcomes by module	<ol style="list-style-type: none"> 1 To roll and wind steel ropes, cables and wires on drums 2. To assemble insulators and fittings in insulating suspension 3. To carry out grounding and zeroing of ground protection and tension cables of overhead power lines and contact networks 4. To tension and dismantle the cables on the supports of overhead power lines and contact 5. To make installation and dismantle of wires and networks
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Rolling of steel ropes, wires and cables with the installation of drums 2. Winding on the drums of wires and cables 3. Compliance with safety when performing electrical work 4. Build insulators in insulating suspension 5. Assembly of reinforcement in insulating suspension 6. Installation of the middle anchoring on the ground, suspension of the suspension cable from the ground to the supports, insert insulators into wires and cables on the ground 7. Installation of air line inputs to buildings and fixing wires on pin insulators 8. Tension and adjustment of wires and cables on overhead power lines 9. Selection of materials based on their properties for use in the installation of overhead high voltage power lines and contact networks

Prerequisites	Installation of overhead power line poles, contact networks and open switchgear structures
Disciplines forming the module	Engineering graphics Theoretical mechanics Theoretical foundations of electrical engineering Electric cars Electrotechnical materials Industrial Electronics Information and communication technology Theoretical bases of installation and dismantling of wires and cables Theoretical bases of mounting supports and structures Mechanic-mechanical practice Electrical practice
Module type (mandatory, optional)	Mandatory
Labor intensity (credits / academic hours)	10 credits/ 300 hours
Duration of the module	
Form of training	Full-time
Teaching methods	Traditional teaching methods - lecture, practical and laboratory classes, problem-solving teaching methods, interactive teaching methods.
Forms of control	Pass/fail exam, exam
Required resources	Library fund, Internet classes, standard educational, laboratory equipment, workshops, practical bases, electronic and educational resources
Language of instruction	Russian/ Kazakh
Post-requisitioning	Electrical equipment of power plants and substations Operation of electrical equipment of power plants and substations Organization of installation, repair, and adjustment of high-voltage equipment Electrical apparatus Production training

Specification of the professional module 3

«Performance of works on diagnostic tests and measurements of parameters of devices of the contact network and overhead power lines»

Scope of competence	Maintenance and repair of high-voltage equipment
Module name and code	Maintenance of equipment of stations, distribution networks and systems
Purpose of the module	To teach students to perform maintenance work on high-voltage equipment.
Level of professional qualification	5
Learning outcomes by module	<ol style="list-style-type: none"> 1. To carry out maintenance of electrical equipment 2. To conduct routine inspections of electrical equipment 3. To set up and test electrical equipment
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Characteristics and principle of operation of electrical equipment 2. Signs of equipment performance 3. Evaluation of the technical condition of electrical equipment 4. Uninterrupted operation of electrical stations, networks 5. Technical condition of electrical equipment 6. Defects and damage to electrical equipment 7. Terms of testing protective equipment and devices 8. Testing and adjustment of electrical equipment 9. Power supply of consumers
Prerequisites	Engineering graphics Theoretical mechanics Theoretical foundations of electrical engineering Electric cars Electrotechnical materials Industrial Electronics Information and communication technology Theoretical bases of installation and

	<p>dismantling of wires and cables</p> <p>Theoretical bases of mounting supports and structures</p> <p>Mechanic-mechanical practice</p> <p>Electrical practice</p>
Disciplines forming the module	<p>Electrical equipment of power stations and substations</p> <p>Organization of installation, repair and adjustment of high-voltage equipment</p> <p>Operation of electrical equipment of power plants and substations</p> <p>Electrical apparatus</p> <p>Industrial training</p>
Module type (mandatory, optional)	Optional
Labor intensity (credits / academic hours)	8 credits/240 hours
Duration of the module	
Form of training	Full-time
Teaching methods	Traditional teaching methods - lecture, practical and laboratory classes, problematic teaching methods, interactive teaching methods.
Forms of control	Pass/fail exam, exam
Required resources	Library fund, Internet classes, standard educational, laboratory equipment, workshops, practical bases, electronic and educational resources
Language of instruction	Kazakh/Russian
Post-requisitioning	<p>Electrical equipment of power plants and substations</p> <p>Operation of electrical equipment of power plants and substations</p> <p>Organization of installation, repair, and adjustment of high-voltage equipment</p> <p>Electrical apparatus</p> <p>Production training</p>

Specification of the professional module 4
«Maintenance of equipment of stations, distribution networks, and systems»

Scope of competence	Maintenance and repair of high-voltage equipment
Module name and code	Maintenance of equipment of stations, distribution networks, and systems
Purpose of the module	To teach students to perform maintenance work on high-voltage equipment
Level of professional qualification	5
Learning outcomes by module	<ol style="list-style-type: none"> 1. To perform repairs to stations, distribution networks and systems 2. To hand over and accept electrical equipment from repair
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Security measures and quality control of repair work 2. Performance and maintainability of equipment 3. Causes and methods of eliminating hazards for personnel performing repairs 4. Types of repair work 5. Procedure for testing electrical equipment. 6. Devices, instruments, equipment and measuring instruments 7. Causes of contactors wear and control methods 8. Procedure and rules for the commissioning 9. Calculation of the parameters of electrical devices and the preparation of design documentation 10. Acceptance of electrical equipment after repair
Prerequisites	<p>Engineering graphics Theoretical mechanics Theoretical foundations of electrical engineering Electric cars Electrotechnical materials Industrial Electronics Information and communication</p>

	<p>technology Mechanic-mechanical practice Electrical practice</p>
Disciplines forming the module	<p>Electrical equipment of power stations and substations Organization of installation, repair and adjustment of high-voltage equipment Operation of electrical equipment of power plants and substations Electrical apparatus Industrial training</p>
Module type (mandatory, optional)	Optional
Labor intensity (credits / academic hours)	8 credits/240 hours
Duration of the module	
Form of training	Full-time
Teaching methods	Traditional teaching methods are lectures, practical and laboratory classes, problem teaching methods, interactive teaching methods.
Forms of control	Pass/fail exam, exam
Required resources	Library fund, Internet classes, standard training, laboratory equipment, workshops, practice bases, electronic educational resources
Language of instruction	Kazakh, Russian
Post-requisitioning	<p>Information and measuring equipment Electromagnetic Transients Automatic control in power engineering Fundamentals of relay protection technology High voltage technique Technological practice</p>

Specification of the professional module 5
«Repair of equipment of stations, distribution networks and systems»

Scope of competence	Electric installation work
Module name and code	Performing diagnostic tests and measurements of parameters of contact network devices and overhead power lines
Purpose of the module	To teach students to work on diagnostic tests and measurements
Level of professional qualification	5
Learning outcomes by module	<ol style="list-style-type: none"> 1. To perform preparatory work for the performance of diagnostic tests and measurements of parameters of the contact network devices and overhead power lines 2. To perform work on the inspection and diagnosis of contact network devices and overhead power lines 3. To perform work on testing and measuring devices of the contact network using portable and stationary diagnostic equipment
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. The order of work and features of the technological operations for diagnostic testing and measurement of parameters of the contact network and overhead power lines 2. Instruments, tools, protective and installation means for the production of diagnostic tests and measurements of parameters of the contact network devices and overhead power lines 3. Protective and installation tools, diagnostic devices and tools 4. Adjustment of instruments for diagnostic testing and measurement of parameters of the contact network devices and overhead power lines
Prerequisites	Installation and disassembly of wires, grounding and tension cables of overhead power lines and contact networks
Disciplines forming the module	<p>Engineering graphics Theoretical mechanics Theoretical foundations of electrical engineering Electric cars</p>

	<p>Electrotechnical materials Industrial Electronics Information and communication technology Theoretical bases of installation and dismantling of wires and cables Theoretical bases of mounting supports and structures Mechanic-mechanical practice Electrical practice</p>
Module type (mandatory, optional)	Mandatory
Labor intensity (credits / academic hours)	9 credits/270 hours
Duration of the module	
Form of training	Full-time
Teaching methods	Traditional teaching methods are lectures, practical and laboratory classes, problem teaching methods, interactive teaching methods.
Forms of control	Pass/fail exam, exam
Required resources	Library fund, Internet classes, standard training, laboratory equipment, workshops, practice bases, electronic educational resources
Language of instruction	Kazakh, Russian
Post-requisitioning	<p>Electrical equipment of power stations and substations Operation of electrical equipment of power plants and substations Organization of installation, repair and adjustment of high-voltage equipment Electrical apparatus Industrial training</p>

Specification of the professional module 6
«Commissioning of medium and high voltage electrical equipment»

Scope of competence	Operation and control of work of high-voltage equipment of electric power systems
Module name and code	Commissioning of electrical equipment of medium and high voltage
Purpose of the module	Teach students to carry out the commissioning of medium and high voltage equipment
Level of professional qualification	5
Learning outcomes by module	<ol style="list-style-type: none"> 1. To apply basic methods and measurement tools electrical and electrical quantities, choose the measuring technique 2. To analyze electromagnetic transients in electric power systems
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Measuring circuits 2. Measuring instruments 3. Computing facilities for processing and analyzing measurement results 4. Methods for calculating transient and steady-state processes in linear and nonlinear electrical circuits 5. Modes of operation of electric power and electrical equipment and systems 6. Calculation of parameters of electrical power and electrical devices, electrical installations, electrical power networks and systems, power supply systems 7. Application programs and computer-aided design tools for solving engineering problems
Prerequisites	<p>Electrical equipment of power stations and substations</p> <p>Organization of installation, repair and adjustment of high-voltage equipment</p> <p>Operation of electrical equipment of power plants and substations</p> <p>Electrical apparatus</p>

	Industrial training
Disciplines forming the module	Information and measuring technology Electromagnetic transients Automatic control in power engineering Basics of relay protection technology The technique of high stresses Technological practice
Module type (mandatory, optional)	Optional
Labor intensity (credits / academic hours)	6 credits/180 hours
Duration of the module	
Form of training	Full-time
Teaching methods	Traditional teaching methods - lecture, practical and laboratory classes, problematic teaching methods, interactive teaching methods.
Forms of control	Pass/fail exam, exam
Required resources	Library fund, Internet classes, standard educational, laboratory equipment, workshops, practical bases, electronic and educational resources
Language of instruction	Russian/ Kazakh
Post-requisitioning	Labor protection and electrical safety Energy Economics

Specification of the professional module 7
«Commissioning of automatic devices»

Scope of competence	Operation and control of high-voltage equipment of electric power systems
Module name and code	Commissioning of automatic devices
Purpose of the module	To teach students to commission automatic devices
Level of professional qualification	5
Learning outcomes by module	<ol style="list-style-type: none"> 1. To carry out the development and evaluation of algorithms of operation and interaction of various automation devices of electric power devices 2. To carry out protection and adjustment of various automation devices for electric power devices 3. To analyze the designs and processes that accompany the operation of high-voltage installations
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Principles of relay protection and automatic control systems in the electric power industry 2. Methods for adjusting the parameters of the regime of electric power systems 3 Types of relays and methods for regulating the parameters of relay protection and automation 4. Automatic re-activation and automatic reserve switching schemes 5. Diagrams of relay protection and automation of electric power devices 6. Relay protection circuits for power lines, transformers, compensators, electric motors, busbars, blocks 7. Emergency control automatics 8. Causes of emergency conditions 9. Electrophysical processes in dielectric media 10. Classification of insulation of

	<p>high-voltage equipment</p> <p>11. Methods for measuring high voltages</p> <p>12. Protection against overvoltage</p>
Prerequisites	<p>Electrical equipment of power plants and substations</p> <p>Organization of installation, repair, and adjustment of high-voltage equipment</p> <p>Operation of electrical equipment of power plants and substations</p> <p>Electrical apparatus</p> <p>Production training</p>
Disciplines forming the module	<p>Information and measuring technology</p> <p>Electromagnetic transients</p> <p>Automatic control in power engineering</p> <p>Basics of relay protection technology</p> <p>The technique of high stresses</p> <p>Technological practice</p>
Module type (mandatory, optional)	Optional
Labor intensity (credits / academic hours)	6 credits/180 hours
Duration of the module	
Form of training	Full-time
Teaching methods	Traditional teaching methods - lecture, practical and laboratory classes, problematic teaching methods, interactive teaching methods.
Forms of control	Pass/fail exam, exam
Required resources	Library fund, Internet classes, standard educational, laboratory equipment, workshops, practical bases, electronic and educational resources
Language of instruction	Russian/ Kazakh
Post-requisitioning	<p>Labor protection and electrical safety</p> <p>Energy Economics</p>

Specification of the professional module 8
«Performance of works on planning, organization, and automation of production»

Scope of competence	Production planning and safe work
Module name and code	Performance of works on planning, organization, and automation of production
Purpose of the module	To teach the students the principles of organization and production planning
Level of professional qualification	5
Learning outcomes by module	<ol style="list-style-type: none"> 1. To understand the essence of market reforms 2. To apply the results of the economic analysis of the activities of the organizations of industry and energy
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Structure of enterprise management 2. Basics of Planning 3. Analysis of the effectiveness of planning 4. Calculation of investment in capital construction
Prerequisites	Information and measuring technology Electromagnetic transients Automatic control in power engineering Basics of relay protection technology Technique of high stresses Technological practice
Disciplines forming the module	Energy Economics Labor protection and electrical safety
Module type (mandatory, optional)	Optional
Labor intensity (credits / academic hours)	8 credits/240 hours
Duration of the module	
Form of training	Full-time
Teaching methods	Traditional teaching methods - lecture, practical and laboratory classes, problematic teaching methods, interactive

	teaching methods.
Forms of control	Pass/fail exam, exam
Required resources	Library fund, Internet classes, standard educational, laboratory equipment, workshops, practical bases, electronic and educational resources
Language of instruction	Kazakh/ Russian
Post-requisitioning	Basics of computer-aided design (AUTOCAD and CREDO) Electrical networks and systems Fundamentals of scientific research Undergraduate practice Diploma project

Specification of the professional module 9
«Performing work to ensure the safe operation of high-voltage equipment»

Scope of competence	Management and design of electrical networks with the use of modern software and hardware
Module name and code	Perform work to ensure the safe operation of high-voltage equipment
Purpose of the module	To teach students how to work to ensure the safe operation of high-voltage equipment
Level of professional qualification	5
Learning outcomes by module	<ol style="list-style-type: none"> 1. To comply with the requirements of safety and labor protection when servicing electrical installations 2. To carry out organizational measures to ensure the safe operation of high-voltage equipment 3. To carry out technical measures to ensure the safe operation of high-voltage equipment
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Fundamentals of protection, fire safety rules and occupational health and safety 2. Safety regulations when servicing electrical installations 3. Safe working methods and means of protection when inspecting electrical equipment 4. The order of registration order, order or list of works performed in the order of current operation 5. Requirements for registration of admission to work and the implementation of supervision during work 6. Making a break in work, transfer to another place, end of work 7. Erroneous or spontaneous switching of switching equipment 8. Check for voltage absence,

	grounding
Prerequisites	Information and measuring technology Electromagnetic transients Automatic control in power engineering Basics of relay protection technology The technique of high stresses Technological practice
Disciplines forming the module	Energy Economics Labor protection and electrical safety
Module type (mandatory, optional)	Optional
Labor intensity (credits / academic hours)	8 credits/240 hours
Duration of the module	
Form of training	Full-time
Teaching methods	Traditional teaching methods - lecture, practical and laboratory classes, problematic teaching methods, interactive teaching methods.
Forms of control	Pass/fail exam, exam
Required resources	Library fund, Internet classes, standard educational, laboratory equipment, workshops, practical bases, electronic and educational resources
Language of instruction	Russian/ Kazakh
Post-requisitioning	Pre-dipolama practice

Specification of the professional module 10
«Conducting research and experimental work in the design of electrical networks and systems»

Scope of competence	Management and design of electrical networks with the use of modern software and hardware
Module name and code	Conducting research and experimental work in the design of electrical networks and systems
Purpose of the module	To teach students to conduct research and experimental work in the design of electrical networks and systems
Level of professional qualification	5
Learning outcomes by module	<ol style="list-style-type: none"> 1. To analyze the stability and optimization of electricity systems 2. To use modern instrumentation tools for software and hardware design for automation and control tasks 3. To calculate and design electrical networks
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Mathematical methods for calculating the normal modes of power systems 2. Studies of statistical and dynamic stability 3. Processing and analysis of the results obtained using modern computer technology 4. Methods of design 5. Means of computer-aided design for solving typical problems of analysis and synthesis of control systems 6. General information about electrical networks and systems 7. Calculations of modes of electrical systems and EC networks.
Prerequisites	<p>Labor protection and electrical safety</p> <p>Energy Economics</p>
Disciplines forming the module	Mathematical problems and computer modeling in power engineering

	<p>Basics of computer-aided design (AUTOCAD and CREDO)</p> <p>Electrical networks and systems</p> <p>Fundamentals of research work</p> <p>Undergraduate practice</p>
Module type (mandatory, optional)	optional
Labor intensity (credits / academic hours)	11 credits/330 hours
Duration of the module	
Form of training	Full-time
Teaching methods	Traditional teaching methods are lectures, practical and laboratory classes, problem teaching methods, interactive teaching methods.
Forms of control	Pass/fail exam, exam
Required resources	Library fund, Internet classes, standard training, laboratory equipment, workshops, practice bases, electronic educational resources
Language of instruction	Kazakh, Russian
Post-requisitioning	Pre-diploma practice

PLAN OF THE EDUCATIONAL PROCESS

Code and profile of education:

0900000 – Power Engineering

Specialty:

0919000 - High Voltage Networks

Qualification:

0919024 – "Applied Bachelor of High Voltage Networks"

Form of training: full-time

Normative training period: 2 years 10 months
on the basis of general secondary education

Index	Modules and types of training activities	Number of credits	Form of control		Amount of study time (hours)							Distribution by courses	
			Exam	Differentiated credit	Total hours	Them:							
						By type of training			On the forms of organization of training				
						Theoretical training	Laboratory and practical works, course projects and works	Practical training **	Audited, contact	SRO			
SROP	SROS												
BM	Basic Modules	30	3	8	900	630	270		720	180	60	1-6	

BM 1	Application of professional vocabulary, drafting of business papers in the sphere of professional activity	6	+	+	180	120	60	-	120	60	15	1-6
BM 2	Understanding the history, role and place of Kazakhstan in the world community	4	+	+	120	120	-	-	120	-		1-6
BM 3	Development and improvement of physical qualities	6	+	+	180	-	180	-	180	-		1-6
BM 4	Application of the basics of philosophical knowledge and knowledge of labour law and regulations for defense of rights in professional activities	6		+	180	180	-	-	120	60	15	1-6
BM 5	Applying basic knowledge of the economy and knowledge of labor laws and regulations to protect their rights in professional activities	4		+	120	120	-	-	90	30	15	1-6
BM 6	Performance, design, reading of design and technological documentation applying programmes	4		+	120	90	30	-	90	30	15	1-6
PM	Professional modules on working qualification	36	+	+	1080	600	240	240	600	480	120	1-6
PM 1	Installation of supports of overhead power lines, contact networks and structures of open distribution devices	11	+	+	330	180	90	60	180	150	30	3-6
PM 2	Installation and dismantling of wires, lightning protection and tension	10	+	+	300	180	60	60	180	120	30	5-6

	cables of overhead transmission lines and contact networks											
PM 3	Maintenance of equipment of stations, distribution networks, and systems	8	+	+	240	120	60	60	120	120	30	3-6
PM 4	Repair of equipment in stations, distribution networks and systems	7	+	+	210	120	30	60	120	90	30	3-6
	Professional qualification of the mid-level specialist	21	+	+	630	300	240	90	300	330	180	1-6
PM 5	Performance of work on diagnostic testing and measuring of parameters of contact network devices and overhead power lines	9	+	+	270	120	120	30	120	150	120	3-6
PM 6	Implementation of commissioning of medium and high voltage electrical equipment	6	+	+	180	90	60	30	90	90	30	3-6
PM 7	Commissioning of automatic devices	6	+	+	180	90	60	30	90	90	30	3-6
	Professional modules of applied bachelor qualifications	27	+	+	810	240	390	180	240	570	390	
PM 8	Performance of works on planning, organization, and automation of production	8	+	+	240	60	120	60	60	180	120	3-6
PM 9	Performing work to ensure the safe operation of high-voltage equipment	8	+	+	240	60	120	60	60	180	120	3-6
PM 10	Conducting research and experimental work in the design of electrical networks and systems	11	+	+	330	120	150	60	120	210	150	3-6
	Total:	114			3420	1770	1140	510	1860	1560	750	

PP	Professional practice (educational, industrial, pre-diploma)	42			1260			1260	180	1080	300	1-6
DP	Diploma project ***	9			270		270		60	210	30	6
IC	Intermediate certification	10			300	300			300			1-6
FE	Final examination	2			60	60			60			6
	Total for compulsory education:	180 (144 +36)			5400 (432 +1080)	2130	1410	1770	2460	2850	1080	
C	Consultations	10			300	300				300		1-6
O	Optional lessons	11			330	330				330		1-6
	Total:	201 (165 +36)			6030 (495+1 080)	2760	1410	1770	2460	3480	1080	

Note:

* Forms of control (the number of course works, examinations), the order of studying the disciplines (distribution by semester) are exemplary and can vary depending on the forms of study, the specifics of specialties, local and other conditions (circumstances), including in accordance with the needs of employers.

** In accordance with the State Educational Establishment of Teachers' Educational Institutions, educational institutions can change up to 50% of the amount of study time allocated for the development of educational material for modules, up to 50% for each module and up to 60% (up to 80% for dual training) of vocational training and professional practice with keeping the total number of hours for compulsory education.