

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

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

EDUCATION PROGRAM

0917000- Conventional Energy
(code and name of the specialty)

Professional Qualifications Level: mid-level specialist

Duration of training: 3 years 10 months.

Astana, 2018

The educational program was reviewed and recommended by the Republican Educational and Methodological Council of the Ministry of Education and Science of the Republic of Kazakhstan

Record No. 3 dated “18”August 2018.

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INTRODUCTION

This educational program on specially 0917000 – “Conventional Energy” is developed in accordance with State compulsory education standard of technical and vocational education, approved by the Government Decree of the Republic of Kazakhstan dated 23 August 2012, No. 1080, National Qualifications framework approved by the Protocol of Republican Tripartite Commission on social partnership and the regulation of social and labor relations, professional standards “Electric Power industry (by branches)”, “Thermal power plants of thermal electric power stations”, “Electricity Supply (by branches)”, “Technical operation, maintenance and repair of electrical and electromechanical equipment (by types)” that define the training content.

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

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

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

The program provides differentiated, individual approach to trainees, development of trainees’ abilities for self-education, teachers have great freedom in the choice of teaching methods, forms of organization and content of the educational process, getting of education at different levels in one institution by students – from the basics of the profession to the levels of the highly skilled worker, mid-level specialist, applied Bachelor’s degree, including in the framework of integrated programs.

Practice has shown that the future middle-level specialists must necessarily pass all levels of vocational training of TVE, namely, increased qualification level for middle level specialist, i.e. only after the worker actually master two or three competencies he/she can become a trained technician.

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

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 in Kazakhstan are used at the designing of the provided experimental modular training program.

1 SYMBOLS AND ABBREVIATIONS

BC	Basic competence
BM	Basic module
SCES	The State compulsory education standard
GD	Graduation design
FC	Final certification
C	Consultation
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
RP&A	Relay protection and Automatics
RK	The Republic of Kazakhstan
TO	Training Outcomes
CAD	Computer-aided design system
TVET	Technical and vocational education and training
TVET&PSE	Technical and vocational, post-secondary education

2 PASSPORT OF THE EDUCATIONAL PROGRAM

Name (*specialty code and name*): 0917000 – Conventional energy

Name and code: 0917013 – “Power Engineering Technician”

Purpose of the education program: preparation of highly qualified specialists who perform maintenance, operation, repair and modernization of thermal and power equipment in accordance with the prepared technical and planning documentation.

Level of education: technical and vocational

Professional qualification: Middle-level Specialist

Qualification levels on NQF/SQF: 4

Professional Area activity *: Energy

Type (s) of employment:

1. Maintenance, operation, repair, and modernization of equipment of power stations, substations, thermal and electrical networks.
2. Identification of the production needs in the fuel and energy resources.
3. Testing, troubleshooting and commissioning of equipment of power stations, substations, thermal and electrical networks.
4. Organization of inspection and testing of relay protection and automation tools.

Object (s) of professional activity: equipment of power stations, substations, thermal and electrical networks.

Program Features **:** The possibility to use dual forms for vocational training, credit system.

Form of study: full-time

Training terms: 3 years 10 months.

Language of instruction: Russian

Volume of credits/hours: 219 credits /6588 hours.

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

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

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

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

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

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

3 COMPETENCE PROFILE

<p>The purpose of the training : perform maintenance, operation, repair and modernization of equipment of power stations, substations, thermal and electrical networks</p>	<p>After the successful completion of the program, the trainee will be able to perform maintenance work, maintenance, repair and modernization of equipment of power stations, substations, thermal and electrical networks</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]: Electric power generation, transmission and distribution: Class [3511]: Production of electricity</p>	
<p>Scope of competences (<i>on core labor functions of professional standard or analysis profession</i>)**</p>	<p>A. Maintenance, operation, repair and modernization of equipment at power stations, substations, thermal and electrical networks B. Determination of the production needs in fuel-energy resources C. Testing, troubleshooting and commissioning of equipment of power stations, substations, thermal and electrical networks D. Organization of inspection and testing of relay protection and automation</p>	
<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>Use professional vocabulary, make business papers in the field of professional activity</p>	<p>BM 1. Application of professional vocabulary, preparation of business papers in the field of professional activity</p>
<p>BC 2</p>	<p>Use the basics of philosophical knowledge, see themselves and their place in society, tolerant to perceive the social, political, ethnic, religious and cultural values</p>	<p>BM 2. Frameworks application of philosophical knowledge, social sciences for socialization and adaptation in the society and the worker's association</p>
<p>BC 3</p>	<p>Maintain and develop an adequate level of physical fitness to ensure</p>	<p>BM 3. Development and improvement of physical</p>

	the full social and professional activities	qualities
BC 4	Perform, issue, read design and technological documentation using application programs BM 4. Execution, design, reading design and technology documentation using application programs	BM 4. Performance, issuance, reading design and technology documentation using application programs
BC 5	Understand the basic laws and mechanisms of the functioning of the modern economic system	BM 5. Application of basic knowledge of the economy and knowledge of labor laws and regulations to protect their rights in their professional activities
BC 6	Understand the history, role and place of Kazakhstan in the world community	BM 06. Understanding the history, role and place of Kazakhstan in the world community
Professional competence		
PC 1.	Carry out maintenance and repair of equipment of power plants, substations, thermal and electrical networks	PM 01. Carrying out maintenance and repair of equipment of power plants, substations, electrical and heat networks
PC 2.	Perform work on the operation of the equipment of power plants, substations, thermal and electrical networks	PM 02. Operation of the equipment of power plants, substations, thermal and electrical networks
PC 3.	To upgrade equipment of power stations, substations, thermal and electrical networks.	PM 03. Modernization of equipment power stations, substations, thermal and electrical networks
PC 4.	Determine the needs of the production in the fuel-energy resources	PM 04. Determination of needs in the production of fuel-energy resources.
PC 5.	Organize acceptance and testing equipment of power stations, substations, thermal and electrical networks	PM 5. Acceptance and testing of equipment of power stations, substations, thermal and electrical networks
PC 6.	Inspect and monitor the operation of the test equipment, relay protection and Automatics	PM 6. Inspection and control of test equipment, relay protection and Automatics

4 LIST OF MODULES AND LEARNING OUTCOMES

Specialty: 0917000-Conventional energy
 Qualification: 091701 3- Power Technician

Module name	Learning outcomes (in accordance with the professional tasks)	Assessment Criteria of learning outcomes	Disciplines forming module
Basic modules			
BM 1. Application of professional vocabulary, the preparation of business papers in the field of professional activity.	LO 1. To have a lexical (1200-1400 lexical units) and a grammatical minimum necessary for reading, translating and communicating in the sphere of their professional activity.	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. Application of terminology in the specialty.	
		3. Defining of the meaning of unfamiliar words and phrases using dictionaries and reference books.	
	LO 2. To know a translation technique (with a dictionary) of professional-oriented texts.	1. Reading and translation (with a dictionary) texts of professional orientation.	
		2. Compilation of coherent, logical reasoned statements in accordance with the proposed topic.	
	LO3. To work with organizational, administrative, information and reference documents using	1. Drawing up in Kazakh (Russian) and foreign languages a resume, autobiography, description, statement,	

	computer technologies	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.	LO 1. To know the most general philosophical questions.	1. Knowledge of basic philosophical concepts.	-Basics of philosophy; -The basics of political science and sociology; -Cultural studies
		2. Explanation of the essence of the process of knowledge and different points of view on the process of knowledge in the history of philosophy.	
		3. Description of the essence of the concepts "dialectic", "laws of dialectics", "being", "matter", "movement", "space and time".	
		4. Identification of the essence and relationship of the main categories of philosophy.	
		5. Explanation of the features of scientific, philosophical and religious pictures of the world.	

	<p>LO 2. To determine the correlation in the life of a person of such philosophical categories as freedom and responsibility, material and spiritual values.</p>	<p>1. Awareness of the degree of personal responsibility for the preservation of life, culture and the natural environment.</p> <p>2. Explanation of the essence of social and ethical problems associated with the development and use of the achievements of science, technology and technology.</p> <p>3. Formulation of their own opinions about the ratio of material and spiritual values in human life.</p> <p>4. Analysis of various points of view on the categories of truth and the meaning of life, the formulation of his own point of view on these concepts.</p>	
	<p>LO 3.To know basic concepts of sociology and political science</p>	<p>1. Knowledge of the main political science concepts: power, political system, political regime, state, forms of government, forms of government, political parties, party systems, political elite, political leadership, geopolitics.</p> <p>2. Awareness of basic sociological concepts: social relations, social phenomena, social processes, social progress.</p>	

		3. The ratio of general social and political processes and individual facts.	
	LO 4. To describe international political processes, geopolitical situation	1. Explanation of the place and role of Kazakhstan in the modern world.	
		2. Description of the structure of the political system of the Republic of Kazakhstan.	
		3. Explanation of the nature and laws of the functioning of political culture.	
	LO 5. To explain the role and place of culture of the peoples of the Republic of Kazakhstan in world civilization	1. Reproduction of the history of national culture, values of traditional Kazakh culture.	
		2. Explanation of the role and place of culture of the peoples of the Republic of Kazakhstan in world civilization.	
		3. Description of the cultural achievements of independent Kazakhstan.	
	LO 6. To explain the moral values and norms that form tolerance and an active personal position.	1. Description of the form, types and history of various cultures and civilizations.	
		2. Explanation of the history and current state of the world and traditional religions.	

		3. Distinction between the judgments of extremist radical and terrorist ideologies.	
		4. Tolerant attitude towards social, ethnic, confessional and cultural differences.	
BM 03. Understanding the history, role and place of Kazakhstan in the world community	LO 3.1 To understand the role and place of culture of the peoples of the Republic of Kazakhstan in world civilization	1 Knowledge of the history of national culture, the values of traditional Kazakh culture.	History of Kazakhstan; Kazakhstan law Culturology
		2. Understanding of the role and place of culture of the peoples of the Republic of Kazakhstan in world civilization.	
		3. Description of the cultural achievements of independent Kazakhstan.	
	LO 3.2 To understand the moral values and norms that form tolerance and an active personal position.	1. Description of the forms, types and history of various cultures and civilizations.	
		2. Knowledge of the history and understands the current state of the world and traditional religions.	
		3. Tolerant perception of social, ethnic, confessional and cultural differences.	
LO 3. To understand the main historical events	1. Knowledge of the chronology and understands the essence of historical		

		<p>events from antiquity to the present.</p> <p>2. Description 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.</p> <p>3. Understanding of the nature and purpose of the political and social changes taking place in the Republic of Kazakhstan after independence.</p>	
<p>BM 4. Application of basic knowledge of the economy and knowledge of labor laws and regulations to protect their rights in their professional activities</p>	<p>LO 1. To know the basic issues in the field of economic theory</p>	<p>1. Knowledge of economic terms, understands the laws and principles of a market economy.</p>	<p>Fundamentals of Economic Theory</p> <p>Fundamentals of law</p>
		<p>2. Awareness the basics of economics of production and consumption.</p>	
		<p>3. Characterization of the tax policy of the state.</p>	
		<p>4. Understanding the sources of inflation and its consequences.</p>	
	<p>LO 2. To determine the forms and types of ownership, types of plans, basic economic indicators of an enterprise</p>	<p>1. Characterization of the main stages and content of planning.</p>	
		<p>2. Performance of the necessary economic calculations using mathematical methods.</p>	

		3. Application of the basic methods of calculating gross domestic and gross national product.
LO 3.To understand the development trends of the world economy, the main objectives of the state’s transition to a green economy	1. Characterization of the development trends of the world economy.	
	2. Understanding of the main objectives of the state's transition to a "green" economy.	
	3. Application of the basic methods of calculating gross domestic product and gross national product.	
LO 4. To be aware of the basic concepts of law and state-legal phenomena	1. Understanding of the nature and basic features of law.	
	2. Knowledge of concepts and abundance by the principles of law and order.	
LO 5.To possess information about the main branches of law	1. Understanding 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.	
	2. Characterization of the methods of administrative regulation.	
	3. Understanding of the need for liability for administrative and corruption offenses.	
	4. Awareness of the basic provisions of	

		civil and family law.	
		5. Awareness of information about the types of tax.	
		6. Understanding of the criminal liability and the grounds for its occurrence.	
	LO 6. To protect his/her rights in accordance with labor laws.	1. Understanding of the rights and obligations of an employee under the Labor Code.	
		2. Distinguishing of the material and disciplinary responsibility of the employee and the employer.	
BM 05. Development and improvement of physical qualities	LO 1. To strengthen health and abide by the principles of a healthy lifestyle.	1. Explanation of the principles and rules of a healthy lifestyle.	Physical education
		2. Description of the physiological basis of the activity of the respiratory, circulatory and energy supply systems under muscle loads.	
		3. Performing sets of exercises for general physical training.	
		4. Application of the rules of a healthy lifestyle in everyday life.	
	LO 2. To improve physical qualities and psycho-physiological abilities	1. Compliance with the rules of team sports.	
		2. Description of the basics of physical activity and methods of its regulation.	

		<p>3. Knowledge of technical accomplishments of the exercise.</p> <p>4. Application of the studied methods of games and individual tactical tasks in the educational game.</p> <p>5. Implementation of control standards and tests provided by the program.</p>	
	LO 3.To provide first aid for injuries and accidents.	<p>1. Explanation of the causes of injury during exercise, methods of injury prevention.</p> <p>2. Providing medical care for injuries.</p>	
BM 6. Execution, execution, reading of design and technological documentation using application programs	LO1. To follow the rules of design documentation	1. Understanding of the rules of design documentation	Engineering graphics. Computer design
		2. Making drawings according to the rules of a unified system of design documentation.	
		3. Defining of the purpose and scale of the drawing technical details.	
		4. Meeting the requirements of the unified system for design documentation (USDD).	
	LO2.To have skills of projecting on the plane	1. Execution and design of the necessary cuts on the drawings.	
		2. Performance of axonometric projection.	

		3. Execution of drawings of diagrams according to symbols in accordance with 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. Execution of specialty schemes using technical drawing tools.	
		2. The use of modern software applications.	
		3. Computer graphics, 3D graphics.	
Professional modules			
PM 01. Maintenance and repair of equipment of power plants, substations, electrical and thermal networks	LO 1.To determine, by the results of preventive inspection and external examination, the condition of the general condition of the equipment and the complexity of the upcoming repair.	1. Definition of types, classifications, scope, purpose, parameters and principle of operation of equipment 2. Conduction of an external examination of the general condition of the equipment 3. Justification of the causes of equipment malfunction.	- Fundamentals of technical mechanics; - Theoretical fundamentals of electrical engineering and heat engineering; - Electrical machines and transformers; - Electrical stations and substations; - Maintenance and repair of equipment;
	LO 2.To choose ways to maintain and repair power equipment	1. Listing the maintenance work of electrical equipment and types of repair 2. Scheduling of preventive maintenance of	- Record keeping; - Industrial training;

		equipment and networks 3. Association of selected repair methods and types of maintenance.	
	LO 3. To apply the best options for the technology of repair of power equipment, thermal and electrical networks	1. Compliance with repair technology 2. Demonstration of repair technology with safety precautions. 3. Evaluation of the cost and effectiveness of the repair	
PM 02. Operation of equipment of power plants, substations, thermal and electrical networks	LO 1. To explain the technical characteristics, design features, operating modes and rules for the technical operation of power equipment	1. Listing of the technical characteristics, design features of operation. 2. Description of the modes of operation and the rules of technical operation. 3. Referring to technical characteristics, design features of equipment to the conditions of their operation.	- Fundamentals of technical mechanics; - Theoretical fundamentals of electrical engineering and heat engineering; - Operation of electrical equipment of power plants and substations; - Thermal power plants and pipelines;
	LO 2. To determine the types of work on the operation of equipment	1. Defining tools for equipment operation 2. Compliance with safety regulations for equipment operation 3. Determination of types of work on the operation of equipment	- Occupational Safety and Health; - Materials Science; - Industrial training;

	LO 3.To apply the optimal modes of operation of power equipment	<ol style="list-style-type: none"> 1. Selection of tools for equipment operation 2. Characteristics of the main areas of equipment operation 3. Performing a sequence of actions in compliance with safety regulations during operation of equipment. 	
PM 03. Modernization equipment of power stations, substations, thermal and electrical networks	LO 1. To justify the goals and stages of modernization of power equipment	<ol style="list-style-type: none"> 1. Conducting a SWOT analysis of the need for modernization 2. Selection of types of modernization 3. Justification of the purpose and stages of modernization of power equipment 	<ul style="list-style-type: none"> - Fundamentals of industrial electronics; - Electrical measurements; - Materials Science; - Installation, adjustment and repair of electrical equipment; - The introduction of new technologies; - Record keeping; - Occupational Safety and Health; - Industrial training;
	LO 2. To modernize power equipment, heat and power networks	<ol style="list-style-type: none"> 1. Selection of tools for upgrading equipment 2. Compliance with safety procedures in the process of modernization 3. Modernization of energy equipment 	
	LO 3. To test the state of the equipment of electrical and thermal networks after modernization	<ol style="list-style-type: none"> 1. Preparation for testing 2. Application of testing methods 3. Reporting on the carried out modernization 	
PM 04. Determination of production needs in fuel and energy resources.	LO 1.To reproduce the main provisions of the compilation of energy balances and the calculation of	<ol style="list-style-type: none"> 1. Expression of the nature and necessity of accounting in the enterprise 2. Differentiating 	<ul style="list-style-type: none"> - Economics and production management; - Energy and resource saving

	energy efficiency indicators of production systems	the material, labor and financial resources of the enterprise 3. Reproduction of the main provisions of the compilation of energy balances and the calculation of energy efficiency indicators of production systems	technologies in energy systems and complexes; - Energy Economics; - Energy and environment; - Record keeping; - Internship
	LO 2. To conduct an energy audit and draw up energy balances of enterprises	1. Differentiation in fixed assets by type. 2. Analysis of the activities of the enterprise for the main production and economic indicators. 3. Conduction of an energy audit and compile the energy balance of the enterprise.	
	LO 3. To conduct an economic analysis and calculation of the needs of power facilities	1. Methods of rationing and distribution of energy resources energy consumption 2. Development of measures for the economical distribution of fuel and energy resources 3. Conducting an economic analysis of the needs of power facilities	
PM 5. Acceptance and testing of equipment of power plants,	LO 1. To conduct testing of power equipment	1. Enumeration of types of testing of power equipment 2. Explanation of the test steps	- Electrical measurements; - Repair, commissioning and testing of

substations, thermal and electrical networks		3. Demonstration of power equipment testing	electrical equipment; - Materials Science; - Record keeping; - Occupational Safety and Health; - Industrial training;
	LO 2. To identify malfunctions in the operation of power equipment	1. Explanation of the causes of equipment malfunctions 2. Evaluation of the complexity of equipment malfunctions 3. Offering troubleshooting solutions	
	LO 3. To conduct regulatory and technical documentation for equipment acceptance	1. Compliance with the rules for drafting regulatory and technical documentation 2. Work with specialized computer programs 3. Registration of the test report, the defective statement	
PM 6. Inspection and monitoring of the operation of instrumentation, means of relay protection and automation	LO 1. To organize a test of the operation of relay protection, automation and measurement devices	1. Description of structures, principles of operation, technical characteristics of elements of relay protection, automation 2. Listing of test methods, relay control methods, automation, calibration of measuring instruments 3. Compilation of test programs for relay protection and automation devices	- Relay protection and automatics; - Basics of the electric drive; - Fundamentals of industrial electronics; - Electrical measurements; - Record keeping; - Occupational Safety and Health; - Industrial training;

		4. Abidance of the required instructions and guidelines when checking the relay protection and automation devices
	LO 2.To carry out adjustment and adjustment of relay protection	<ol style="list-style-type: none"> 1. Explanation of the principles of setting RP&A 2. Registration of normative and technical documentation 3. Adjustment and adjustment of relay protection
	LO 3.To conduct a test of means of relay protection and automation	<ol style="list-style-type: none"> 1. Enumeration of types of testing of means of RP&A 2. Drawing up test schemes, assembling RP&A tools 3. Demonstration of the test of RP&A

4.1 Specification of the basic module 1

“Application of professional vocabulary, the preparation of business papers in the field of professional activity”

Scope of competence	Basic
Module name	Application 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 solve actual problems of communication in various fields of professional activity;
Level of professional qualification	5
Learning outcomes by module	LO 1. To have a lexical (1200-1400 lexical units) and grammatical minimum necessary for reading, translating and communicating in the sphere of their professional activity. LO 2. To know a translation technique (with a dictionary) of professional-oriented texts. LO 3. To conduct professional dialogical speech and business negotiations in Kazakh (Russian) and foreign languages.
Summary of content (sections, topics)	1. Knowledge of lexical and grammatical material in the specialty necessary for professional communication. 2. Application of terminology in the specialty. 3. Determination of the meaning of unfamiliar words and phrases using dictionaries and reference books. 4. Reading and translation (with a dictionary) texts of professional orientation. 5. Compilation of coherent, logical reasoned statements in accordance with the proposed topic. 6. Logically and consistently express opinions in accordance with the situation. 7. Drawing up in Kazakh (Russian) and foreign languages a summary, autobiography, description, statement, complaint, power of attorney, receipt 8. Compliance with the basic requirements for the text of the document. 9. Creation of documents on the computer that meet modern requirements and established regulations
Prerequisites	Kazakh, Russian, foreign languages
Disciplines that form module	- Professional Kazakh (Russian) language - Professional foreign language
Module type (mandatory,	Mandatory

optional)	
Labor intensity (credit /academic hours)	6 credits/180 hours
Duration of the module	3-5 semester
Form of training	Full-time
Teaching methods	Lecture, practical.
Control forms	Pass fail exam, exam
Required resources	Personal computer, software. Educational and methodical literature: T.I. Akhmetov “Professional Kazakh language”; T.M. Voiteleva “Russian language and speech culture. Didactic materials”; A.L. Lugovaya “English for students of energy majors: a training manual”;
Language of instruction	Russian, Kazakh
Post-requisites	-Record keeping; -Introduction to the field.

4.2 Specification of the basic module 2

“Application frameworks of philosophical knowledge, social sciences for socialization and adaptation in society and the work collective”

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 work collective.
Level of professional qualification	4
Learning outcomes by module	<p>LO 1. To be aware of the most general philosophical questions.</p> <p>LO 2. To determine the correlation in the life of a person of such philosophical categories as freedom and responsibility, material and spiritual values.</p> <p>LO 3. To know basic concepts of sociology and political science.</p> <p>LO 4. To describe international political processes, geopolitical situation.</p> <p>LO 5. To explain the role and place of culture of the peoples of the Republic of Kazakhstan in world civilization.</p> <p>LO 6. To explain the moral values and norms that form tolerance and an active personal position.</p>
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Knowledge of basic philosophical concepts. 2. Explanation of the essence of the process of knowledge and different points of view on the process of knowledge in the history of philosophy. 3. Description of the essence of the concepts "dialectic", "laws of dialectics", "being", "matter", "movement", "space and time". 4. Identification of the essence and relationship of the main categories of philosophy. 5. Explanation of the features of scientific, philosophical and religious pictures of the world. 6. Awareness of the degree of personal responsibility for the preservation of life, culture and the natural environment. 7. Explanation of the essence of social and ethical problems associated with the development and use of

	<p>the achievements of science, technology and technology.</p> <p>8. Formulation of their own opinions about the ratio of material and spiritual values in human life.</p> <p>9. Analysis of various points of view on the categories of truth and the meaning of life, the formulation of his own point of view on these concepts.</p> <p>10. Knowledge of the main political science concepts: power, political system, political regime, state, forms of government, forms of government, political parties, party systems, political elite, political leadership, geopolitics.</p> <p>11. Awareness of the main sociological concepts: social relations, social phenomena, social processes, social progress.</p> <p>12. The ratio of general social and political processes and individual facts.</p> <p>13. Explanation of the place and role of Kazakhstan in the modern world.</p> <p>14. Description of the structure of the political system of the Republic of Kazakhstan.</p> <p>15. Explanation of the nature and laws of the functioning of political culture.</p> <p>16. Reproduction of the history of national culture, values of traditional Kazakh culture.</p> <p>17. Explanation of the role and place of culture of the peoples of the Republic of Kazakhstan in the world civilization.</p> <p>18. Description of the cultural achievements of independent Kazakhstan.</p> <p>19. Description of the form, types and history of various cultures and civilizations.</p> <p>20. Explanation of the history and current state of the world and traditional religions.</p> <p>21. Distinction between the judgments of extremist radical and terrorist ideologies.</p> <p>22. Tolerant attitude to social, ethnic, religious and cultural differences.</p>
Prerequisites	<ul style="list-style-type: none"> -World history; -History of Kazakhstan; -Basics of economic theory.
Disciplines that form module	<ul style="list-style-type: none"> - Fundamentals of philosophy - Basics of Politology and sociology - Cultural studies

Module type (mandatory, optional)	Mandatory
Labor intensity (credit /academic hours)	6 credits/180 hours
Duration of the module	3-4 semester
Form of training	Full-time
Teaching methods	Lecture, practical.
Control forms	Test, pass/fail exam.
Required resources	Personal computer, software. A.A. Gorelov “Basics of philosophy”; A.I. Kravchenko “Basic of sociology”; N.M. Demidov “Principles of sociology and political science. Tutorial; S.P. Mamontov “Basics of Cultural Science”
Language of instruction	Russian, Kazakh
Post-requisites	-Basics of entrepreneurship; -Business law of the Republic of Kazakhstan.

4.3 Specification of the basic module 3

“Understanding of the history, role and place of Kazakhstan in the world community, respectful and caring attitude to historical heritage and cultural traditions”

Scope of competence	
Module name	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	To show scientifically - proven facts, continuity and consistency of historical and cultural development from ancient times to the present day
Level of professional qualification	3, 4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To understand the role and place of culture of the peoples of the Republic of Kazakhstan in world civilization 2. To understand the moral values and norms that form tolerance and active personal position 3. To understand the main historical events 4. To determine the causal relationships of historical events.
Summary of content (sections, topics)	<p>This module describes the knowledge and skills necessary for understanding the essence and purpose of culture; development of national identity, understanding the essence and patterns of historical events that occurred from antiquity to the present. As a result of studying the module, students should master: the basic concepts and laws of culture, religion and civilization; chronological boundaries and the essence of the main historical periods of Kazakhstan. When studying a module, students should: analyze the role and place of the culture of the peoples of the Republic of Kazakhstan in world civilization; show tolerance on the basis of universal moral values and humanistic outlook; deny misanthropic, extremist, radical, and terrorist ideologies.</p>
Prerequisites	School program: History, Man and Society, Basics of Law
Disciplines that form module	Modern history of Kazakhstan, Culturology
Module type (mandatory, optional)	Mandatory

Labor intensity (credit /academic hours)	4 credit/120 hours
Duration of the module	3-5 semester
Form of training	Full-time
Teaching methods	Traditional teaching methods - lectures, practical classes, problem teaching methods, interactive teaching methods
Forms of control	Pass fail exam, exam
Required resources	Library fund, Internet classes, electronic educational resources
Language of instruction	Kazakh, Russian
Post-requisites	Fundamentals of Philosophy, Fundamentals of Sociology and Political Science

4.4 Specification of base module 4 "Application of the basic knowledge of the economy and knowledge of labor laws and regulations to protect rights in professional activities"

Scope of competence	-
Module name	BM 4. Application of the basic knowledge of the economy and knowledge of labor laws and regulations to protect rights in professional activities
Purpose of the module	To acquaint with the basic theoretical positions of the economic activity of the energy enterprise in the conditions of market economy, the main
Level of professional qualification	3, 4
Learning outcomes by module	<ol style="list-style-type: none"> 1. To know the basic issues in economic theory 2. To determine the forms and types of property, types of plans, the main economic indicators of the enterprise. 3. To understand the development trends of the world economy, the main objectives of the state's transition to a "green" economy. 4. To determine the possibility of success and risk business. 5. To be aware of the basic concepts of law and state-legal phenomena 6. To have information about the main branches of law 7. To protect rights in accordance with labor laws
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Possession of economic terms, understands the laws and principles of a market economy. 2. Possession of the basics of economics of production and consumption. 3. Characteristics of the tax policy of the state. 4. Understanding the sources of inflation and its consequences. 5. Characteristics of the main stages and content of planning. 6. Performance of the necessary economic calculations using mathematical methods. 7. Application of the basic methods of calculating the gross domestic and gross national product. 8. Characteristics of the development trend of the world economy. 9. Understanding the main objectives of the state transition to a "green" economy. 10. Application of the basic methods of calculating

	<p>gross domestic product and gross national product.</p> <p>11. Understanding the nature and basic features of law.</p> <p>12. Awareness of concepts and respect for the principles of law and order.</p> <p>13. 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>14. Characteristics of administrative regulation methods.</p> <p>15. Understanding the need for liability for administrative and corruption offenses.</p> <p>16. Knowledge of the main provisions of civil and family law.</p> <p>17. Knowledge of information about the types of tax.</p> <p>18. Understanding of criminal responsibility and the grounds for its occurrence.</p> <p>19. Understanding the rights and obligations of an employee according to the Labor Code.</p> <p>20. Distinction of material and disciplinary responsibility of an employee and an employer.</p>
Prerequisites	School program: Man and Society, Basics of Law, Geography
Disciplines that form module	Fundamentals of Economics Fundamentals of law
Module type (mandatory, optional)	Mandatory
Labor intensity (credit /academic hours)	4 credit/120 hours
The duration of the module	3-4 semester
Form of training	Full-time
Teaching methods	Traditional teaching methods - lectures, practical classes, problem teaching methods, interactive teaching methods
Control forms	Pass fail exam
Required resources	Library fund, Internet classes, typical educational, electronic educational resources
Language of instruction	Kazakh, Russian
Post-requisites	Principles of Philosophy, Labor Law of the Republic of Kazakhstan, Family Law of the Republic of Kazakhstan

4.5 Specification of the basic module 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 follow a healthy lifestyle in order to exercise their mental and physical abilities in the course of their daily activities.
Level of professional qualification	4
Learning outcomes by module	LO 1. To strengthen health and abide by the principles of a healthy lifestyle. LO 2. To improve physical qualities and psycho-physiological abilities LO 3. To provide first aid for injuries and accidents.
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Explanation of the principles and rules of a healthy lifestyle. 2. Description of the physiological basis of the activity of the respiratory, circulatory and energy supply systems under muscle loads. 3. Performing sets of exercises for general physical training. 4. Application of the rules of a healthy lifestyle in everyday life. 5. Compliance with the rules of team sports. 6. Description of the basics of physical activity and methods of its regulation. 7. Knowledge of technical accomplishments of the exercise. 8. Application of the studied methods of games and individual tactical tasks in the educational game. 9. Implementation of control standards and tests provided by the program. 10. Explanation of the causes of injuries during exercise, methods of injury prevention. 11. Providing medical care for injuries.
Prerequisites	Biology (Anatomy)
Disciplines that form module	Physical education
Module type	Mandatory
Labor intensity (credit /academic hours)	6 credits/180 hours
Duration of the module	1-8 semester

Form of training	Full-time
Teaching methods	Methods of education of motor qualities: uniform method, variable method, repeated method, interval method, competitive method, game method, circular method.
Forms of control	Pass fail exam, exam
Required resources	Display of movements in kind or in the form of images, sports equipment. M. Gandil, F. Delavier "Anatomy of strength training for women"; Kokkonen Y., Nelson A. "Anatomy of stretching exercises. Illustrated guide to the development of flexibility and muscle strength ";
Language of instruction	Russian, Kazakh
Post-requisites	Occupational Safety and Health

4.6 Specification of the basic module 6 “Performance, design, reading of design and technological documentation using application programs”

Scope of competence	-
Module name	Performance, design, 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 of 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 the specialty, using the means of technical drawing. 10. The use of modern software applications. 11. Knowledge 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 module	<ul style="list-style-type: none"> - Engineering graphics; - Computer design.
Module type	Required / Optional
Labor intensity (credit RK/academic hours)	4 credits/120 hours
Duration of the module	1 semester
Form of training	Full time / dual

Learning technology	Modular
Teaching methods	Verbal (conversation, lecture); visual practical; problem search; reproductive; inductive; case method
Forms of control	Pass fail 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 “Maintenance and repair of equipment of power stations, substations, electric and heat networks”

Scope of competence	Maintenance, operation, repair and modernization of equipment of power plants, substations, thermal and electrical networks
Name and code of the module	PM 01. Maintenance and repair of equipment of power plants, substations, electrical and thermal networks
Purpose of the module	After studying this module, the student will be able to carry out maintenance and repair of equipment of power plants, substations, electrical and thermal networks.
Level of professional qualification	4
Learning outcomes for the module	LO 1. To determine, by the results of preventive inspection and external examination, the condition of the general condition of the equipment and the complexity of the upcoming repair. LO 2. To choose ways to maintain and repair power equipment LO 3. To apply the best options for the technology of repair of power equipment, thermal and electrical networks
Summary of content (sections, topics)	1. Definition of types, classifications, scope, purpose, parameters and principle of operation of equipment; 2. Conduction of an external examination of the general condition of the equipment; 3. Justifies the causes of equipment malfunction; 4. Listing of a routine maintenance of electrical equipment and types of repair; 5. Scheduling of preventive maintenance of equipment and networks; 6. Corresponding to the selected methods of repair and types of maintenance; 7. Compliance with the repair technology; 8. Demonstration of the technology repair work in compliance with safety regulations; 9. Estimation the cost and effectiveness of the repair.
Prerequisites	Geometry, physics, drawing
Disciplines that form module	- Fundamentals of technical mechanics; - Theoretical fundamentals of electrical engineering and heat engineering; - Electrical machines and transformers;

	<ul style="list-style-type: none"> - Electrical stations and substations; - Maintenance and repair of equipment; - Record keeping; - Industrial training.
Module type	Mandatory
Labor intensity (credit /academic hours)	18 credits/540 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Form of organization of educational process. Teaching methods.	Lecture, independent work, practical.
Control forms	Pass fail exam, exam
Required resources	<p>Personal computer, software, stands.</p> <p>M. Moldakulova "Engineering Technology";</p> <p>B.Kangozhin "Fundamentals of electrical production";</p> <p>V.Yashkov "Adjustment of electrical equipment";</p> <p>MMKatsman "Electric cars";</p> <p>Sibikin Yu.D. "Maintenance, repair of electrical equipment and networks of industrial enterprises";</p> <p>Sibikin Yu.D. "Handbook of electrician on repair of electrical equipment of industrial enterprises";</p>
Language of instruction	Russian, Kazakh
Post-requisites	<ul style="list-style-type: none"> - Fundamentals of technical mechanics; - Theoretical fundamentals of electrical engineering and heat engineering; - Operation of electrical equipment of power plants and substations; - Thermal power plants and pipelines; - Occupational Safety and Health; - Materials Science; - Industrial training;

4.8 Specification of professional module 2
“Operation of equipment of power stations, substations, thermal and electrical networks”

Scope of competence	Maintenance, operation, repair and modernization of equipment of power plants, substations, thermal and electrical networks
Name and code of the module	PM 02. Operation of equipment of power plants, substations, heating and electrical networks
Purpose of the module	After studying this module, the student will be able to carry out work on the operation of the equipment of power plants, substations, thermal and electrical networks.
Level of professional qualification	4
Learning outcomes for the module	LO 1. To explain the technical characteristics, design features, operating modes and rules for the technical operation of power equipment LO 2. To determine the types of work on the operation of equipment LO 3. To apply optimal modes operation of power equipment
Summary of content (sections, topics)	1. Listing of the technical characteristics, design features of operation; 2. Characterization of the modes of operation and the rules of technical operation; 3. Correlation of the technical characteristics, design features of equipment with their operating conditions; 4. Definition of tools for equipment operation; 5. Compliance with safety regulations for equipment operation; 6. Determination of types of work on the operation of equipment; 7. Selection of tools for equipment operation; 8. Characteristics of the main areas of equipment operation; 9. Performance of a sequence of actions in compliance with safety regulations during operation of the equipment;
Prerequisites	- Fundamentals of technical mechanics; - Theoretical fundamentals of electrical engineering and heat engineering; - Electrical machines and transformers; - Electrical stations and substations;

	- Maintenance and repair of equipment;
Disciplines that form module	- Fundamentals of technical mechanics; - Theoretical fundamentals of electrical engineering and heat engineering; - Operation of electrical equipment of power plants and substations; - Thermal power plants and pipelines; - Occupational Safety and Health; - Materials Science; - Industrial training;
Module type (mandatory, optional)	Mandatory
Labor intensity (credit /academic hours)	16 credits/ 480 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Form of organization of educational process Teaching methods	Lecture, independent work, practical.
Control forms	Pass fail exam, exam
Required resources	Personal computer, software, stands. A.Aitimov "Electrical Engineering"; Likhachev V.L. "Handbook of Asynchronous Electric Motor Wrapper"; Fedorchenko A.A., Yu.G. Sindeev "Electrical Engineering with the basics of electronics: studies. for learning. prof. schools, lyceums and stud. colleges "; J.Amanzholov "Labor protection in power systems";
Language of instruction	Russian, Kazakh
Post-requisites	- Fundamentals of industrial electronics; - Electrical measurements; - Materials Science; - Installation, adjustment and repair of electrical equipment; - The introduction of new technologies; - Record keeping; - Occupational Safety and Health; - Industrial training.

4.9 Specification of professional module 3 “Modernization of equipment of power stations, substations, thermal and electrical networks”

Scope of competence	Maintenance, operation, repair and modernization of equipment of power plants, substations, thermal and electrical networks
Name and code of the module	PM 03. Modernization of equipment of power plants, substations, thermal and electrical networks
Purpose of the module	After studying this module, the student will be able to modernize the equipment of power plants, substations, thermal and electrical networks
Level of professional qualification	4
Learning outcomes for the module	LO 1. To justify the goals and stages of modernization of power equipment LO 2. To modernize power equipment, heat and power networks LO 3. To test the state of the equipment of electrical and thermal networks after modernization
Summary of content (sections, topics)	1. Conducting a SWOT analysis of the need for modernization 2. Selection of types of modernization 3. Justification of the purpose and stages of modernization of power equipment 4. Selection of tools for upgrading equipment 5. Compliance with safety procedures in the process of modernization 6. Modernization of power equipment 7. Preparation for testing 8. Application of testing methods 9. Reporting on the modernization carried out.
Prerequisites	- Fundamentals of technical mechanics; - Theoretical fundamentals of electrical engineering and heat engineering; - Operation of electrical equipment of power plants and substations; - Thermal power plants and pipelines; - Occupational Safety and Health; - Materials Science; - Industrial training;
Disciplines that form module	- Fundamentals of industrial electronics; - Electrical measurements; - Materials Science; - Installation, adjustment and repair of electrical

	<p>equipment;</p> <ul style="list-style-type: none"> - The introduction of new technologies; - Record keeping; - Occupational Safety and Health; - Industrial training;
Module type (mandatory, optional)	Mandatory
Labor intensity (credit /academic hours)	14 credits/420 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Form of organization of educational process. Teaching methods.	Lecture, independent work, practical.
Control forms	Pass fail exam, exam
Required resources	<p>Personal computer, software, stands, laboratory equipment.</p> <p>J.Amanzholov "Labor protection in power systems"; Krasnik V.V. "Questions and answers on the rational use and safe maintenance of electrical installations of consumers"; V.I. Skala, N.V. Skala, B.V. Skala "Office work in the Republic of Kazakhstan (with samples of formulary + CD) in Kazakh and Russian languages"; B. Minto "The principle of the pyramid of Minto. Golden rules of thinking, business writing and oral presentations "; Yu. D. Sibikin "Safety in the installation, maintenance and repair of electrical equipment of enterprises: a guide"; V. A. Panfilov "Electrical Measurements. A textbook for students of institutions of secondary vocational education "; Pankratov VV, S. A. Pokotilo "Electrical Engineering and Electronics. Tutorial"</p>
Language of instruction	Russian, Kazakh
Post-requisites	<ul style="list-style-type: none"> - Economics and production management; - Energy and resource saving technologies in energy systems and complexes; - Energy Economics; - Energy and environment; - Electrical measurements; - Repair, commissioning and testing of electrical equipment; - Materials Science; - Occupational Safety and Health;

- Record keeping;
- Internship.

4.10 Specification of professional module 4 “Identification of the production needs in fuel-energy resources”

Scope of competence	Determination of production needs in fuel and energy resources
Name and code of the module	PM 04. Identification of production needs in fuel and energy resources.
Purpose of the module	After studying this module, the student will be able to determine the needs of production in the fuel and energy resources.
Level of professional qualification	4
Learning outcomes for the module	LO 1. To reproduce the main provisions of the compilation of energy balances and the calculation of energy efficiency indicators of production systems LO 2. To conduct an energy audit and draw up energy balances of enterprises LO3.To conduct an economic analysis and calculation of the needs of power facilities
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Expression of the nature and necessity of accounting in the enterprise; 2. Distinction of material, technical, labor and financial resources of an enterprise; 3. Reproduction of the main provisions of the compilation of energy balances and the calculation of energy efficiency indicators of production systems; 4. Difference in fixed assets by type; 5. Analysis of the activities of the enterprise for the main production and economic indicators; 6. Conducting energy audits and compiling the energy balance of the enterprise; 7. Methods of rationing and distribution of energy resources of energy consumption; 8. Development of measures for the economical distribution of fuel and energy resources; 9. Conducting an economic analysis of the needs of power facilities.
Prerequisites	<ul style="list-style-type: none"> - Fundamentals of industrial electronics; - Electrical measurements; - Materials Science; - Installation, adjustment and repair of electrical equipment; - The introduction of new technologies; - Record keeping;

	<ul style="list-style-type: none"> - Occupational Safety and Health; - Industrial training;
Disciplines that form module	<ul style="list-style-type: none"> - Economics and production management; - Energy and resource saving technologies in energy systems and complexes; - Energy Economics; - Energy and environment; - Record keeping; - Internship.
Module type (mandatory, optional)	Mandatory
Labor intensity (credit /academic hours)	12 credits/360 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Form of organization of educational process. Teaching methods.	Lecture, independent work, practical.
Control forms	Pass fail exam, exam
Required resources	<p>Personal computer, software, stands.</p> <p>Polulyakh L. "Economic social geography of the world";</p> <p>Krasnik V.V. "Market electric power industry: connection to power grids, purchase and sale of electric power";</p> <p>J.Amanzholov "Labor protection in power systems";</p> <p>D.P. Woomek, Jones D. "Lean Manufacturing. How to get rid of losses and achieve prosperity of your company ";</p> <p>V.I. Skala, N.V. Skala, B.V. Skala "Office work in the Republic of Kazakhstan (with samples of formulary + CD) in Kazakh and Russian languages";</p> <p>B. Minto "The principle of the pyramid of Minto. Golden rules of thinking, business writing and oral presentations ";</p>
Language of instruction	Russian, Kazakh
Post-requisites	<ul style="list-style-type: none"> - Electrical measurements; - Repair, commissioning and testing of electrical equipment; - Materials Science; - Record keeping; - Occupational Safety and Health; - Industrial training.

4.10 Specification of professional module 5 “Acceptance and testing of equipment of power stations, substations, thermal and electrical networks”

Scope of competence	Testing, troubleshooting and acceptance of equipment of power plants, substations, thermal and electrical networks
Name and code of the module	PM 5. Acceptance and testing of equipment of power plants, substations, thermal and electrical networks
Purpose of the module	After studying this module, the student will be able to carry out the acceptance and testing of equipment of power plants, substations, thermal and electrical networks
Level of professional qualification	4
Learning outcomes for the module	LO 1. To conduct testing of power equipment LO 2. To identify malfunctions in the operation of power equipment LO 3. To conduct regulatory and technical documentation for equipment acceptance
Summary of content (sections, topics)	1. Enumeration of types of tests for power equipment; 2. Explanation of the test stages; 3. Demonstration of power equipment testing; 4. Explanation of the causes of equipment malfunctions; 5. Evaluation of the complexity of equipment malfunctions; 6. Offering of ways to solve troubleshooting; 7. Compliance with the rules for drafting regulatory and technical documentation; 8. Work with specialized computer programs; 9. Registration of the test report, the defect list.
Prerequisites	- Economics and production management; - Energy and resource saving technologies in energy systems and complexes; - Energy Economics; - Energy and environment; - Record keeping; - Internship
Disciplines that form module	- Electrical measurements; - Repair, commissioning and testing of electrical equipment; - Materials Science; - Record keeping; - Occupational Safety and Health;

	- Industrial training.
Module type (mandatory, optional)	Mandatory
Labor intensity (credit /academic hours)	13 credits/ 390 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Form of organization of educational process. Teaching methods.	Lecture, independent work, practical.
Forms of control	Pass fail exam, exam
Required resources	Personal computer, software, stands. Klyuzhev Yu. "Materials science with the basics of electrical material science"; V. A. Panfilov "Electrical Measurements. A textbook for students of institutions of secondary vocational education "; V.I. Skala, N.V. Skala, B.V. Skala "Office work in the Republic of Kazakhstan (with samples of formulary + CD) in Kazakh and Russian languages"; B. Minto "The principle of the pyramid of Minto. Golden rules of thinking, business writing and oral presentations "; Yu. D. Sibikin "Safety in the installation, maintenance and repair of electrical equipment of enterprises: a guide";
Language of instruction	Russian, Kazakh
Post-requisites	- Relay protection and automatics; - Basics of the electric drive; - Fundamentals of industrial electronics; - Electrical measurements; - Record keeping; - Occupational Safety and Health; - Industrial training.

4.11 Specification of professional module 6
“Inspection and monitoring of the operation of instrumentation, means of relay protection and automation”

Scope of competence	Organization of testing and testing of means of relay protection and automation
Name and code of the module	PM 6. Inspection and monitoring of the operation of instrumentation, means of relay protection and automation
Purpose of the module	After studying this module, the student will be able to check and monitor the work of instrumentation, means of relay protection and automation
Level of professional qualification	4
Learning outcomes for the module	LO 1. To organize a test of the operation of relay protection, automation and measurement devices; LO 2. To carry out adjustment and adjustment of relay protection; LO 3. To conduct a test of means of relay protection and automation.
Summary of content (sections, topics)	1. Description of structures, principles of operation, technical characteristics of elements of relay protection, automation; 2. Enlisting test methods, relay control methods, automation, calibration of measuring instruments; 3. Preparation of test programs for relay protection and automation devices; 4. Following the required instructions and guidelines when checking the relay protection and automation devices; 5. Explanation of the principles of setting RP&A; 6. Registration of normative and technical documentation; 7. Adjustment and adjustment of relay protection; 8. Enumeration of types of testing of means of rare-earth materials; 9. Drawing up test schemes, assembling RP&A tools; 10. Demonstration of test RP&A.
Prerequisites	- Theoretical foundations of electrical engineering; - Fundamentals of technical mechanics; - Electric cars; - Electrotechnical materials; - Occupational Safety and Health; - Electrical measurements;

	<ul style="list-style-type: none"> - Engineering graphics; - Industrial electronics.
Disciplines that form module	<ul style="list-style-type: none"> - Relay protection and automatics; - Basics of the electric drive; - Fundamentals of industrial electronics; - Electrical measurements; - Record keeping; - Occupational Safety and Health; - Industrial training;
Module type (mandatory, optional)	Mandatory
Labor intensity (credit /academic hours)	10 credits/300 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Form of organization of educational process. Teaching methods.	Lecture, SROP, practical.
Forms of control	Pass fail exam, exam
Required resources	<p>Personal computer, software, stands.</p> <p>A.V. Bulychev, A.A. Navolochny "Relay protection and electrics";</p> <p>J.Amanzholov "Labor protection in power systems";</p> <p>Yu. D. Sibikin "Safety in the installation, maintenance and repair of electrical equipment of enterprises: a guide";</p> <p>V.I. Skala, N.V. Skala, B.V. Skala "Office work in the Republic of Kazakhstan (with samples of formulary + CD) in Kazakh and Russian languages";</p> <p>B. Minto "The principle of the pyramid of Minto. Golden rules of thinking, business writing and oral presentations ";</p>
Language of instruction	Russian, Kazakh
Post-requisites	Knowledge gained by a student in the study of modules is used to conduct research projects (term papers, course projects, theses, research papers, etc.)

EDUCATIONAL PROCESS PLAN

Code and the education profile 0900000 – Energy
 Specialty 0917000 – Conventional energy
 Qualification 091701 3- Electrician technician

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

Code module	The name cycles disciplines/modules, practices	Credit of the Republic of Kazakhstan	Differenial pass fail	Exam	The amount of training time (hours)				Distribution of semester	
					TOTAL	From them:				
						Theoretical training	Practical training *	Industrial training		Individual training
GED	General Education Discipline	48			1448	1448			1-4	
BM	Basic modules	30			900	480	-	360	60	3-8
BM 1	Application of professional vocabulary in the sphere of activities to meet the challenges of interpersonal and intercultural interaction	6	+		180	90		60	30	3-8

BM 2	Application of the basics of philosophical knowledge, social sciences for socialization and adaptation in society and the workforce	6	+		180	180	-	-	-	3-8
BM 3	Understand the history, role and place of Kazakhstan in the world community	4		+	120	120	-	-	-	3-8
BM 4	Application of the basic knowledge of economics and knowledge of labor laws and regulations to protect their rights in their professional activities	4	+		120	60	-	60		3-8
BM 5	Development and improvement of physical qualities	6		+	180	-	-	180	-	3-8
BM 6	Performance, design, reading of design and technological documentation using application programs	4	+		120	30		60	30	3-8
PM	Professional modules on working qualifications (including industrial training and professional practice)	48	+	+	1440	360	720	270	90	3-6
PM 1	Maintenance and repair of equipment of power stations, substations, electric and heat networks	18	+	+	540	120	300	90	30	3-6
PM 2	Maintenance of equipment of power stations, substations, thermal and electrical networks	16	+	+	480	120	240	90	30	3-6
PM 3	Acceptance and testing of equipment of power plants, substations, thermal and electrical networks	14	+	+	420	120	180	90	30	3-6
PM	Professional modules for mid-level specialist qualifications (including in-	35			1050	330	420	210	90	3-8

	service training and professional practice)									
PM 4	Modernization of equipment of power plants, substations, thermal and electrical networks	12	+	+	360	120	150	60	30	3-8
PM 5	Determination of production needs in fuel and energy resources	13	+	+	390	120	150	90	30	3-8
PM 6	Inspection and monitoring of the operation of instrumentation, means of relay protection and automation	10	+	+	300	90	120	60	30	3-8
	Subtotal:	161			4838	2618	1140	840	240	
PP	Pre-diploma practice	10			300		300			8
DP	Diploma project	9			270	180			90	8
IC	Intermediate certification	10			300	300				1-8
FC	Final certification	2			60	60				8
	Total compulsory education				5768	3158	1440	840	330	
C	Consultation	13			400	400				1-8
O	Optional	14			420	420				1-8
	Total:	219			6588	3978	1440	840	330	

Note:

* The forms of control (the number of course papers, 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 compulsory education standard the Technical and Vocational Education, 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.

