

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

“DEVELOPMENT OF LABOR SKILLS AND STIMULATION OF
WORKPLACES” PROJECT

EDUCATIONAL PROGRAM

0918000-Renewable Energy
(code and name of the specialty)

Training level: mid-level specialist

Duration of training: 3 years 10 months.

Astana, 2018

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INTRODUCTION

The educational program is developed on the the basis of the the basic normative documents defining the training content by specialty **0918000 – “Renewable Energy”**:

- The State compulsory standard of technical and vocational education, approved by the Government of the Republic of Kazakhstan dated August 23, 2012 No. 1080.
- National Qualifications framework of the Republic of Kazakhstan (joint order of the Minister of labor and social protection of population of the Republic of Kazakhstan on September 24, 2012 No. 373-m and the Minister of education and science of the Republic of Kazakhstan on September 28, 2012 No.444)
- Sectorial Qualifications framework in the field of “Power industry”, approved by the Protocol on November 17, 2016, No. 12-03-333.
- Professional standard Project “Electrical equipment for power stations and networks (by types), developed by Legal Entities Association “Kazakhstan Association of oil-and-gas and energy sector organizations “KAZENERGY”, version 1, 2015, date of indicative revision is 2018

The program is designed to implement the principles of a democratic management nature of education, expanding the boundaries of academic freedom and the authority of the educational institutions that will ensure the adaptation of the system of technical and vocational education to the changing needs of society, the economy and the labor market. The program aims at training professionals capable of design and research activities at the facilities of electricity and electrical engineering. The focus of the education program is on pursuing stem-related and power training with use of information technologies, studying a wide range of disciplines, including technology of production and transmission of electric energy, calculation modes of electrical devices, electrical networks, electric power systems, modern design automation, energy saving issues, etc.

Modular-competence approach is based on the development of training and assessment of training outcomes in the form of competence of students, as well as the possibility of using a differentiated approach to teaching.

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

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

ABBREVIATIONS AND DESIGNATIONS USED

BC	Basic competence
BM	Basic module
SCES	The State compulsory education standard
K&S	Knowledge & skills
NCO	National classifier of occupations
NQF	National Qualifications framework
NQS	National qualifications system
EP	Educational program
SQF	Sectorial Qualifications framework
PS	Professional standard
PC	Professional competence
PM	Professional module
RK	The Republic Of Kazakhstan
LO	Learning outcome
TVE	Technical and vocational education
RES	Renewable energy sources
IC	Interim certification;
FC	Final certification
IC 01	Certification in educational institutions
IC 02	Evaluation of the professional skills level and qualifications awarding
C	Consultations
O	Optional classes

PASSPORT WORKING EDUCATIONAL PROGRAM

The name of the (*the code and name of the specialty*): 0918000 – “Renewable Energy”

Name and code: 0918013 - “Power Engineering Technician”

Purpose of the working educational program Preparation of a middle-level specialist who works on the installation and operation of equipment and systems of renewable energy sources with professional competence in the field of electric power.

Level of education: technical and professional.

Professional qualification level: Middle-Level Specialist.

Qualification levels according to NQF/SQF: 4

Professional activity area *: Energy

Type (s) of employment:**

1. Performance of works on maintenance of power stations equipment with conventional and renewable energy
2. Work on the selection and installation of equipment and renewable energy systems
3. Technical inspection, repair and operation of renewable energy systems
4. Electricity supply, management and control of operation of electrical networks and electrical renewable energy

Object (s) of professional activity *:** electric power systems; Power plants and complexes based on non-conventional and renewable energy sources; energy companies, production workshops, sites for equipment repair; power supply network of the enterprise.

Program Features **:** The possibility to use dual forms of professional training / credit technology.

Form of study: full-time.

Training terms: 3 years, 10 months.

Language of training: State (Kazakh) and Russian.

The volume of credits/hours: 6588 h.

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).

* Specify PS (methodical recommendations on the design and execution of professional standards, Astana, 2017.)

* Specifies the systems, articles (objects), phenomena, processes, and technology that aims activity.

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

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

COMPETENCY PROFILE

Purpose of the training : works on the installation and operation of equipment and renewable energy systems	After completion of training the trainee will be able to perform the installation and operation of equipment and renewable energy systems
Section names, section, group, class and subclass according to GCEA* (<i>according to PS</i>)	Section D : Electricity supply, feed gas, steam supply and air conditioning Section [35] : Electricity supply, gas, steam supply and air conditioning Group [351] : Production, transmission and distribution of electricity: Class [3511] : Production of electricity
Scope of competences (<i>on core labor standard of professional functions or analysis profession</i>) **	A. Performance of works on maintenance of equipment of power stations with conventional and renewable energy B. Performance on the selection and installation of equipment and renewable energy systems C. Inspection, repair and operation of renewable energy systems D. Electricity, management and control of operation of electrical networks and electrical renewable energy

List of competencies and modules in the context of an academic degree/qualifications/vocations

Competence Code	Competence (in line with labor functions and skill levels)	Modules
Basic Competence		
BC 1	Apply professional language, compile and execute business documents in the sphere of activities to meet the challenges of interpersonal and intercultural interaction	BM 1. Application of professional vocabulary, drawing up official papers in the field of professional activity
BC 2	Apply the basics of philosophical knowledge, see themselves and their place in society, tolerant to perceive the social, political, ethnic, confessional and cultural development	BM 2. Application of the fundamentals of philosophical knowledge, social sciences for socialization and adaptation in the society and the labor collective
BC 3	Understand the history, role and	BM 03. Understanding of

	place of Kazakhstan in the world community	the history, role and place of Kazakhstan in the world community, respectful and careful attitude towards important historical and cultural traditions
BC 4	Understand the basic laws and mechanisms of functioning of the modern economic system	BM 4. the application of basic knowledge economy and knowledge of labor legislation and legal norms for the protection of their rights in professional activity
BC 5	Maintain and develop the appropriate level of physical fitness to ensure full social and professional activities	BM 5. Development and improvement of physical qualities
BC 6	Research and organize their work, applying computer technology in the field of professional activity	BM 6. Execution, registration, read design and technological documentation using applications
Professional competence		
PC 1	Perform maintenance work on the electrical equipment of the station with conventional energy sources	PM 1. Performance of works on maintenance of conventional stations
PC 2	Perform maintenance work on equipment of electric stations with renewable energy	PM 2. Perform maintenance work on equipment renewable sources of energy
PC 3	Organize work on choice and promote renewable energy sources	PT 3 Works organization for selection and implementation of renewable energy sources
PC 4	Install renewable energy systems	PM 4. Installation of renewable energy systems
PC 5	Perform the installation and dismantling of renewable energy systems	PM 5. Execution of works on installation and dismantling of renewable energy systems
PC 6	Perform operation of an electricity generation station based on renewable energy	PM 6. Implementation of work on the operation of an electricity generation

		station based on renewable energy
PC 7	Carry out repair and adjustment of renewable energy systems	PM 7. Perform repairs and adjustment of renewable energy systems
PC 8	Perform supply of electrical networks and electrical renewable energy sources	PM 8. Work performance on electricity supply to electrical networks and renewable energy sources
PC 9	Manage and control the operation of electrical networks and electrical renewable energy	PM 9. Management and control of operation of electrical networks and electrical renewable energy

LIST OF MODULES AND LEARNING OUTCOMES

Module name	Learning outcomes (in accordance with the professional tasks)	Assessment Criteria of learning outcomes	Disciplines that form the module
Basic modules			
BM 1 Application professional vocabulary, preparation of business documents in the sphere of professional activity	LO 1. To know the grammar and terminology of the Kazakh (Russian) and foreign languages for communication in the sphere of their professional activities	1 Knowledge of lexical and grammatical materials in the specialty necessary for professional communication	Professional Kazakh (Russian) language Professional foreign language Office work
		2 Understanding the value of written and oral communication in Kazakh (Russian) and foreign languages.	
		3. Application of communication skills to establish and develop relations of cooperation and partnership.	
		4 Writing texts using various presentation forms.	
	LO 1.2 To master the translation technique (with a dictionary) of professional- oriented texts	1 Reading and translation (with a dictionary) of professional texts	
		2. Independent compilation of coherent, logical reasoned statements in accordance with the proposed topic.	
		.3 Understanding and participation in the discussion.	
	LO 1.3 To work with organizational, administrative, and	1. Drawing up in Kazakh (Russian) and foreign languages a	

	information and reference documents using computer technology	summary, autobiography, description, statement, complaint, power of attorney	
		2 Compliance with the basic requirements for the text of the document.	
		3. Creation of documents on a computer that meet modern requirements and established regulatory acts.	
BM 2. Application frameworks of philosophical knowledge, social sciences for socialization and adaptation in the society and the labor collective	LO 2.1 To define ratio in human life such philosophical categories as freedom and responsibility, material and spiritual values	1.Understanding social and ethical issues related to the development and use of science, engineering and technology	Fundamentals of philosophy Basics of Political science and sociology
		2. Understanding the process of training and different perspectives on the process of cognition in the history of philosophy	
		3. Application of fundamental analysis skills on philosophical and methodological problems in science at the present stage of its development	
	LO 2 2. To understand international political processes, the geopolitical situation	1 Use political knowledge in everyday life and in their professional activities	
2 Participate in discussions on topical issues problems and prospects			

		development, etc.	
		3 Use social, moral and legal standards governing the relationship of man to man, society, the environment	
	LO 2.3 To understand the moral values and norms that form tolerance and active personal attitude	1. Understanding of the role and place of the culture of the Peoples Republic of Kazakhstan in world civilization	
		2. Application of approaches and practices critical analysis applied to various cultural forms and processes of modern society	
		3. Application of national traditions and customs of different countries in their professional activities	
BM 3. Understanding the history, role and place of Kazakhstan in the world community, respectful and caring attitude to historical heritage and cultural traditions	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.	Modern history of Kazakhstan Culturology
		2. Understanding the role and place of culture of the peoples of the Republic of Kazakhstan in world civilization.	
		3. Characterization of the cultural achievements of independent Kazakhstan.	
	LO 3.2 To understand the	1. Characterization of the forms, types and	

moral values and norms that form tolerance and an active personal position.	history of various cultures and civilizations.
	2 .Knowledge of history and understands the current state of the world and traditional religions.
	3. Tolerant perception of social, ethnic, confessional and cultural differences.
LO 3.3 To understand the main historical events	1 Knowledge of the chronology and understands the essence of historical events from antiquity to the present.
	2. Expansion 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 of the nature and purpose of political and social changes taking place in the Republic of Kazakhstan after independence.
	4. Characterization of the achievements of independent Kazakhstan
LO 3.4 To determine causal relationships of	1. Identification of the basic facts, processes and phenomena that

	historical events.	reflect and characterize the integrity and consistency of the history of Kazakhstan.	
		2 Establishment of the connection between historical events.	
		3. Application of historical sources.	
BM 4. Application of basic knowledge of the economy and knowledge of labor laws and regulations to protect their rights in their professional activities.	LO 4.1 To determine the forms and types of ownership, types of plans, basic economic indicators of an enterprise	1. Performance of the necessary economic calculations using mathematical methods	Essentials of Economics Fundamentals of law
		2. Discussion of the main economic indicators of the enterprise.	
		3. Conducting of measurements of the cost of working time to perform a certain work	
		4 Definition of methods for cost reduction and increase of profitability.	
	LO 4.2 To understand the development trends of the world economy, the main objectives of the state's transition to a green economy	1 Understanding the main objectives of a state's transition to a green economy.	
		2. Application of basic methods for calculating gross domestic product and gross national product.	
		3. Definition of global economic problems, ways to overcome them	
	LO 4.3 To protect rights in accordance with labor laws	1. Understanding of the legal status in shaping the identity of a citizen in accordance with the provisions of the Constitution of the	

		<p>Republic of Kazakhstan</p> <p>2. Application of evidence-based argumentation of one's own position in specific legal situations using normative acts.</p> <p>3 Understanding of responsibility for administrative and corruption offenses.</p>	
	LO 4.4 To know the basic concepts of law and state-legal phenomena	<p>1. Knowledge of the concepts and abidance by the principles of law and order.</p> <p>2. Applying evidence for arguing one's own position in specific legal situations using regulations.</p> <p>3. Understanding of responsibility for administrative and corruption offenses.</p>	
BM 5. Development and improvement of physical qualities	LO 5.1 To strengthen health and abide by the principles of a healthy lifestyle	<p>1. Understanding the importance of physical culture for health promotion, the role of physical culture and sports in the development of the country</p> <p>2. Performing a set of exercises for general physical training.</p> <p>3. Applying the rule of a healthy lifestyle in everyday life.</p>	Physical culture
	LO 5.2 To improve physical qualities and psycho-physiological	<p>1. Knowledge of the exercise technique</p> <p>2. Compliance with the rules of team sports.</p>	

	abilities	3. Application of the learned game techniques and individual tactical tasks in an educational game.	
		4 Performance of control standards and tests provided by the program	
	LO 5.3 To provide first aid for injuries and accidents.	1. Understanding the causes of injury during exercise, methods of injury prevention	
		2. Provision of first aid for injuries.	
		3 Evaluation of the difficulty and risk arising during the execution of various physical activities, own and others' physical capabilities	
BM 6. Execution, execution, reading of design and technological documentation using application programs	LO 6.1 To read and execute drawings in accordance with regulatory and legal documentation	1 Using of geometric constructions in drawings (dividing segments, angles, circles into equal parts, drawing regular polygons and conjugations for constructing images of the shapes of various objects)	Drawing Computer graphics
		2. Evaluation of the sequence of building the image in accordance with the specific features of the shape of the imaged object.	
		3. Dimensioning, drawing contours of parts to scale,	

		execution of basic inscriptions in accordance with the Unified system for design documentation.	
	LO 6.2 To perform drawing work of simple and medium complexity	1 Compliance with the rules of design and reading of general drawings and assembly drawings	
		2 Application of machine-building drawing skills	
		3. Design and reading of assembly drawings according to sketches.	
	LO 6.3 To select and use optimal computer programs for solving specific production problems.	1. Using an application package for the development of design documentation.	
		2. The use of computer equipment and graphic editors in solving design and specific production problems.	
		3. Creating and editing drawings of various professional orientations.	
		4. Formatting and editing texts, inserting objects, setting objects on the text	
Professional modules			
PM 1. Perform maintenance of traditional plant equipment	LO 1.1 To determine the types of equipment of traditional stations	1. Characteristic types of equipment of traditional stations	Theoretical foundations of electrical engineering
		2. Understanding of the principles of maintenance work on equipment at traditional stations	Fundamentals of technical mechanics
		3. Definition of types of equipment of	Electrical

		traditional station	machines and transformers
	LO 1.2 To perform maintenance work on transformers, switchgears and switching devices	1. Preparation of tools and materials	Electrical measurements Electrotechnical materials Computer Technology Basics Labor and environmental protection
		2. Compliance with the rules of safety and labor protection during the maintenance of transformers, switchgears and switching devices	
		3. Performing maintenance of transformers, switchgears and switching devices.	
	LO 1.3 To perform maintenance work on overhead and cable lines, buses and insulators	1 Preparation of tools and materials.	
		2. Compliance with safety and labor protection regulations when performing maintenance work.	
		3.Maintenance of overhead and cable lines, tires and insulators	
PM 2. Performing maintenance of renewable energy equipment	LO 2.1 To identify types of renewable energy equipment	1. Characterization of types of equipment for renewable energy sources	Electrical renewable energy systems
		2. Understanding the principles of maintenance of renewable energy equipment.	
		3. Determination of types of renewable energy equipment	
	LO 2.2 To perform maintenance work on renewable energy systems	1. Compliance with the rules of safety and labor protection when performing work on the maintenance of renewable energy	

		systems.	
		2. Carrying out preparatory work on the maintenance of renewable energy systems	
		3 Knowledge of technologies for servicing renewable energy systems	
		4 Maintenance of renewable energy systems	
PM 3 Organization of work on the selection and implementation of renewable energy sources	LO 3.1 To determine renewable energy resources in Kazakhstan	1. Characterization of renewable energy resources in the Republic of Kazakhstan	Non-conventional and renewable sources of energy
		2. Understanding the importance of renewable energy	
		3. Definition of types of renewable energy sources	
	LO 3.2 To choose types of renewable energy sources by regional characteristics	1. Economic and geographical characteristics of the regions of Kazakhstan	
		2. Consideration of regional features when choosing renewable energy sources.	
		3. Determining the region and type of renewable energy source.	
	LO 3.3 To perform organizational work on the introduction of renewable energy sources	1 Definition of organizational work and estimated cost.	
		2. Preparation of a work plan for the introduction of renewable energy sources.	

		3. Organizing the implementation of renewable energy sources.	
PM 4. Installation of renewable energy systems	LO 4.1.To identify the equipment of systems for installing renewable energy sources.	1. Defining types of materials and tools for installation of equipment	Labor and environmental protection
		2. Formulation of safety rules when installing equipment for renewable energy systems.	Electrical equipment for renewable energy systems
		3 Defining equipment for renewable energy systems	
	LO 4.2To install a renewable energy system	1. Technical characteristics of renewable energy equipment	
		2. Application of safety regulations during installation work.	
		3. Installing a renewable energy system	
		4. Monitoring of the operation of installed devices and equipment of renewable energy sources	
	LO 4.3 To perform start-up and commissioning of the renewable energy system	1. Application of safety rules for commissioning.	
		2 Evaluation of plant components and devices for the conversion of energy from renewable sources	
		3. Comissioning works in renewable energy systems in accordance	

		with the rules		
PM 5. Execution of assembly and disassembly of renewable energy systems	LO 5.1 To determine the types of work on the installation and dismantling of renewable energy systems	1. Formulation of safety rules during assembly and disassembly.	Environmental and safety Protection	
		2. Defining types of materials and tools for installation and dismantling	Installation and commissioning electrical equipment renewable sources of energy	
		3. Defining types of work on the installation and dismantling of renewable energy systems		Electrical renewable energy systems
	LO 5.2 To determine the technical requirements for the installation and dismantling of renewable energy systems	1. Formulation of technical requirements for the installation and dismantling of renewable energy systems		
		2 Description of work on the installation and dismantling of renewable energy systems		
		3. Determination of the composition of the specialized brigade of an enterprise or specialized setup organization.		
	LO 5.3 To perform work on the installation and dismantling of equipment for renewable energy systems	1. Application of safety regulations during assembly and disassembly.		
		2. Installation and dismantling of equipment for renewable energy systems		
		3 Replacing the equipment of renewable energy		

		systems		
PM 6. Performance of work on operation of the power generating station based on renewable energy sources	LO 6.1 To determine the types of work on the operation of renewable energy systems	1. Defining of tools for equipment operation	Educational - familiarization practice	
		2. Formulation of safety rules for equipment operation.	Industrial training.	
		3. Defining of types of work on the operation of renewable energy systems	Labor and environmental protection	
	LO 6.2 To perform performance monitoring	1. Verification of the performance of each part of the system (its equipment or components)	Operation, repair and commissioning of electrical equipment for renewable energy sources	
		2. Verification of the performance of the entire system as a whole.	Basics of industrial electronics	
		3. Verification of compliance of the actual characteristics of the equipment with the characteristics specified in the contract	Relay protection and electrical	
	LO 6.3 To perform work on operation of an electricity generating station based on renewable energy sources	1 Defining the technical requirements	Electrical equipment for renewable energy systems	
		2. Applying safety regulations for the operation of solar systems and wind generators.		
		3. Operation of solar equipment and wind generators		
		4. Operation of biomass equipment, geothermal station and modern type of rechargeable batteries		
	PM 7. Performance of work on repair	LO 7.1 To determine the types of work on the	1. Preparation of the workplace in accordance with the	Maintenance, repair and commissioning

and adjustment of renewable energy systems	repair and commissioning of renewable energy systems	requirements of labor protection	of electrical equipment of renewable energy sources
		2 Defining types of repair	
		3 Determine the types of work on the repair and adjustment of renewable energy systems	
	LO 7.2 To determine the technical requirements for the repair and commissioning of renewable energy systems	1. Formulation of technical requirements for the repair and commissioning of renewable energy systems	
		2. Descriptions of the repair and adjustment of renewable energy systems.	
		3. Defining the composition of the specialized brigade of an enterprise or specialized setup organization.	
	LO 7.3 To perform repair and adjustment of renewable energy systems	1. Applying safety regulations when setting up equipment.	
		2 Performance of adjustment works	
		3 Performing verification work	
PM 8. Performance of work on the power supply of electrical networks and electrical equipment of renewable energy sources	LO 1. To determine types of work on the electricity supply of electrical networks and electrical equipment of renewable energy sources	1. Reading the power supply scheme of electrical networks of renewable energy sources	Power supply of industrial enterprises Organization of electricity metering system of renewable energy sources
		2. Characteristics of electrical equipment of electrical networks of electricity supply of renewable energy sources	
		3. Identification of	

		types of work on the power supply of electrical networks and electrical equipment of renewable energy sources	
	LO 8.2 To perform work on the power supply of electrical networks and electrical equipment of renewable energy sources	1 Identification of consumers of electricity on reliability	
		2. Determination of the classification of electricity receivers according to the required degree of uninterrupted power supply and operating mode.	
		3. Performance of work on the power supply of electrical networks and electrical equipment of renewable energy sources	
	LO 8.3 To analyze energy efficiency using renewable energy sources	1 Technical characteristics of renewable energy equipment	
		2 Types of tariffs	
		3. Calculation of the cost of generation in 1 kW * hour	
PM 9. Management and control of operation of electrical networks and electrical equipment of renewable energy sources	LO 9.1 To manage renewable energy supply networks	1. Characterization of electrical equipment of electrical networks of power supply of renewable energy sources.	Power supply network management and renewables communication
		2. Application of technical dispatching facilities at renewable energy facilities.	Organization of electricity metering system for RES
		3 Application of	

		automatic system of metering, control and management of electricity consumption
LO 9.2 To take into account the availability and status of renewable energy sources	1	Performance of organizational work on the elimination of the malfunction at the stations and power lines of renewable energy sources.
	2.	Performance of the accounting and control of electricity consumption at renewable energy facilities.
	3.	Selection of the necessary equipment for renewable energy sources depending on the technical requirements.
LO 9.3 To organize and systemize electricity metering of renewable energy sources	1.	Characterization of technical means of electricity metering at renewable energy facilities
	2.	Description of technical characteristics and types of meters
	3	Understanding of the scheme of inclusion of meters to the network

4.1 Specification Basic Module 1

“Application of professional vocabulary, drafting of official papers in the field of professional activity”

Scope of competence	
Name and code of the module	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 apply professional vocabulary, draw up and execute business documents in the field of activity to solve problems of interpersonal and intercultural interaction.
Level of professional qualification	3
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. Knowledge of lexical and grammatical material in the specialty necessary for professional communication. 2. Understanding the value of written and oral communication in Kazakh (Russian) and foreign languages. 3. The use of communication skills to establish and develop relations of cooperation and partnership. 4. Writing texts using various presentation forms. 5. Reading and translating (with a dictionary) texts of professional orientation. 6. Independent compilation of coherent, logical reasoned statements in accordance with the proposed topic. 7. Understanding of the discussion topics and participation in its discussion. 8. Drawing up in Kazakh (Russian) and foreign languages a summary, autobiography,

	description, statement, complaint, power of attorney, receipt. 9. Compliance with the basic requirements for the text of the document. 10. Creation on the computer of documents that meet modern requirements and established regulations
Prerequisites	Kazakh language, Russian language, Foreign language (elementary courses)
Discipline that form the module	Professional Kazakh (Russian) language. Professional foreign language. Office work
Module type (mandatory, optional)	mandatory
Labor intensity (credit /academic hours)	6 credits / 180 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	modular
Form of educational process organization	Lecture, independent work, practical lessons, laboratory assignments, practice
Teaching methods	Oral questioning, testing, report, summary, creative task
Forms of control	Pass/fail exam, exam
Required resources	Personal computer, methodical literature on the following subjects: Professional Kazakh (Russian) language, Professional foreign language, culture of business communication. B.Murzalina, S.Nurkeeva, G.Nurgazina, M. Sagyndykova, S. Baytasova. Textbook for intensive training in Kazakh language, 2009; B.A. Radovel English for technical higher schools. Tutorial, 2016
Language of instruction	Kazakh, Russian
Post-requisites	Office work, Cultural studies, Information technology.

4.2 Specification of Basic Module 2

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

Scope of competence	
Name and code of the module	Application frameworks of philosophical knowledge, social sciences for socialization and adaptation in the society and the labor collective
Purpose of the module	After studying this module the participant will be able to use the foundations of philosophical knowledge, see themselves and their place in society, tolerant to perceive the social, political, ethnic, confessional and cultural development
Level of professional qualification	3
Learning outcomes by module	<ol style="list-style-type: none"> 1. To determine the ratio in the life of a person of such philosophical categories as freedom and responsibility, material and spiritual values. 2. To understand international political processes, geopolitical situation 3. To understand the moral values and norms that form tolerance and an active personal position. 4. To understand international political processes and geopolitical situation
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Understanding the essence of social and ethical problems associated with the development and use of the achievements of science, technology and technology. 2. Understanding the essence of the process of knowledge and different points of view on the process of knowledge in the history of philosophy. 3. Application of skills to analyze the main world outlook and methodological problems arising in science at the present stage of its development. 4. The use of political science knowledge in everyday life and in their professional activities. 5. Participation in discussions on relevant

	<p>issues problems and prospects development, etc. 6. The use of social, moral and legal norms governing the attitude of a person to a person, society, environment. 7. Understanding the role and place of culture of the peoples of the Republic of Kazakhstan in world civilization. 8. Using approaches and methods of critical analysis in relation to various cultural forms and processes of modern society. 9. Application of national traditions and customs of various countries in their professional activities.</p>
Prerequisites	World history; History Of Kazakhstan; Ecology; Basics of economic theory
Discipline that form the module	Basics of philosophy. Basics of political science and sociology. Cultural studies
Module type (mandatory, optional)	mandatory
Labor intensity (credit /academic hours)	6 credits / 180 hours
The duration of the module	3-8 semester
Form of training	Full-time
Training technologies	modular
The form of educational process organization	Lecture, independent work, practical lessons, labs, practice
Teaching methods	Oral questioning, testing, report, summary, creative task
Required resources	Personal computer, methodical literature on the following subjects: Basics of philosophy, Fundamentals of law, Foundations of sociology, Basics of political science, Culture Science A.I. ZelenACv Philosophy: educational-methodical complex. -2003. Ye.R. Mkrtchyan Foundations of sociology,

	tutorial, Volgograd, 2017
Language of instruction	Kazakh, Russian
Post-requisites	Philosophy; Political science; Sociology

4.3 Specification of Basic Module 3

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

Scope of competence	History, role and place of Kazakhstan in the world community
Name and code of the module	Understanding of the history, role and place of Kazakhstan in the world community, respectful and careful attitude towards important historical and cultural traditions
Purpose of the module	After studying this module the participant will be able to understand the history, role and place of Kazakhstan in the world community
Level of professional qualification	3
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 civilization2. To understand the moral values and norms that form tolerance and active personal position3. To understand the main historical events4. 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.</p> <p>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.</p> <p>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</p>

	terrorist ideologies.
Prerequisites	History, Man and Society, foundations of law
Discipline that form the module	Modern history of Kazakhstan, Cultural studies
Module type (mandatory, optional)	Mandatory
Labor intensity (credit /academic hours)	4 credits / 120 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	modular
Form of educational process organization	Lecture, independent work, practical lessons, labs, practice
Teaching methods	Oral questioning, testing, report, summary, creative task
Control Forms	Pass fail exam
Required resources	Personal computer, educational-methodical literature in disciplines: Modern history of Kazakhstan, cultural studies. G.V.Caan History Kazakhstan: Almaty kitap baspasy. -2011. O.A.Colomeytseva Modern History of Kazakhstan, Almaty, 2016
Language of instruction	Kazakh, Russian
Post-requisites	Basics of philosophy, foundations of sociology and political science

4.4 Specification of Basic Module 4

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

Scope of competence	
Name and code of the module	Application of basic knowledge of economics and knowledge of labor legislation and legal norms for the protection of their rights in professional activity
Purpose of the module	After studying this module the participant will understand the basic laws and mechanisms of functioning of the modern economic system
Level of professional qualification	3
Learning outcomes by module	<ol style="list-style-type: none"> 1. To determine the forms and types of ownership, types of plans, basic economic indicators of enterprises 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
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Performance of the necessary economic calculations using mathematical methods. 2. Discussion of the main economic indicators of the enterprise. 3. Conducting measurements of the cost of working time to perform a certain work. 4. Definition of methods to reduce costs and increase profitability 5. Understanding the main objectives of the state's transition to a "green" economy. 6. The use of basic methods of calculating gross domestic product and gross national product. 7. Definition of global economic problems, ways to overcome them 8. Understanding of the legal status in shaping the identity of a citizen in accordance with the provisions of the Constitution of the Republic of Kazakhstan. 9. Application of evidence-based

	<p>argumentation of one's own position in specific legal situations using normative acts.</p> <p>10. Understanding of responsibility for administrative and corruption offenses.</p>
Prerequisites	<p>Mathematics;</p> <p>History Of Kazakhstan;</p> <p>The individual and society;</p> <p>Fundamentals of State and law</p>
Discipline that form the module	<p>Essentials of Economics</p> <p>Fundamentals of law</p>
Module type (mandatory, optional)	mandatory
Labor intensity (credit /academic hours)	4 credits / 120 hours
Duration of the module	3-8 semester
Form of training	Full-time
Training technologies	modular
Form of educational process organization Teaching methods	<p>SRSP lecture, practical exercises</p> <p>The oral interview, testing, report, summary, creative task</p>
Control Forms	Pass fail exam
Required resources	<p>Personal computer, educational-methodical literature in disciplines</p> <p>Fundamentals of Economics,</p> <p>Fundamentals of law.</p> <p>N.I. Zhidkov Fundamentals of economics for students of technical specialties. -2009.</p> <p>K.S. Birzhanov, K.B.Ibrayeva. Fundamentals of law of the Republic of Kazakhstan. -2013.</p>
Language of instruction	Kazakh, Russian
Post-requisites	<p>Basics of entrepreneurship; Business Law of the Republic of Kazakhstan;</p> <p>Marketing</p>

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

Scope of competence	
Name and code of the module	Development and improvement of physical qualities
Purpose of the module	After studying this module the participant will be able to maintain and develop the appropriate level of physical fitness to ensure full social and professional activities
Level of professional qualification	3
Learning outcomes by module	<ol style="list-style-type: none"> 1. To strengthen health and adhere to the principles of a healthy lifestyle 2. To improve physical qualities and psycho-physiological abilities 3. To provide first aid for injuries and accidents.
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Understanding the importance of physical culture for health promotion, the role of physical culture and sports in the development of the country. 2. Performing a set of exercises for general physical training. 3. Application of the rule of a healthy lifestyle in everyday life. 4. Mastering the technique of doing the exercise. 5. Compliance with the rules of team sports. 6. Application of the studied methods of games and individual tactical tasks in the educational game. 7. Implementation of control standards and tests provided by the program. 8. Understanding the causes of injury during exercise, methods of injury prevention. 9. Providing medical care for injuries. 10. Evaluation of the difficulties and risks arising during the execution of various physical activities, own and others' physical capabilities.
Prerequisites	Valeology; Biology

Discipline that form the module	Physical culture
Module type (mandatory, optional)	mandatory
Labor intensity (credit /academic hours)	6 credit /180 hours
Duration of the module	3-8 semester
Form of training	Full-time
Training technologies	modular
Form of educational process organization	Independent work, lecture, practical exercises
Teaching methods	Oral questioning, testing, report, summary, creative task
Forms of control	Pass fail exam, exam
Required resources	Sports hall, educational literature on the discipline of physical education and sport. Yu.I. Evseev. Physical education for university students. - Rostov-on-Don. -2003.
Language of instruction	Kazakh, Russian
Post-requisites	Fundamentals of Life Safety

4.6 Specification of Basic Module 6

“Performance, design, reading of design and technological documentation with the use of applications”

Scope of competence	
Name and code of the module	Performance, design, reading of design and technological documentation with the use of applications
Purpose of the module	After studying the training module will be able to research and organize their work, applied computer technology in the field of professional activity
Level of professional qualification	3
Learning outcomes by module	<ol style="list-style-type: none"> 1.To read and execute drawings in accordance with the regulatory and legal documentation. 2. To perform drawing work of simple and medium complexity 3. To choose and use optimal computer programs for solving specific production problems.
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Application of geometric constructions in drawings (division of segments, angles, circles into equal parts, drawing regular polygons and conjugations for constructing images of the shapes of various objects) 2. Evaluation of the sequence of building the image in accordance with the specific features of the shape of the imaged object. 3. Dimensioning, drawing contours of parts to scale, the implementation of basic inscriptions in accordance with the Unified system for design documentation. 4. Compliance with the rules of design and reading general drawings and assembly drawings. 5. Application of engineering drawing skills. 6. Design and reading of the sketching assembly drawings. 7. Using the application package for the development of design documentation. 8. The use of computer equipment and graphic editors in solving design and specific production problems.

	9. Creating and editing drawings of various professional orientations. 10. Formatting and editing texts, inserting objects, setting objects on the text.
Prerequisites	Physics, computer science, mathematics curriculum
Discipline that form the module	Drawing. Computer graphics.
Module type (mandatory, optional)	mandatory
Labor intensity (credit /academic hours)	4 credits / 120 hours
The duration of the module	3-8 semester
Form of training	Full-time
Training technologies	Modular
Form of educational process organization Teaching methods	Lecture, independent work, practical lessons, labs, practice Oral questioning, testing, report, summary, creative task
Forms of control	Pass fail exam
Required resources	Personal computer, educational-methodical literature in disciplines Physics I, II, Mathematics I, II, Information and Communication Technologies. I.P. DeshAC, S.N. ACvalyov, K.G. KryazhenACv, V.A. Mordvinov, N.I. Trifonov, S.V. Tulinov, V.Tsyppkin. Information and communication technology: a training manual, 2005.- P.147
Language of instruction	Kazakh, Russian
Post-requisites	Basics of mechanics, Drawing

4.7 Specification of Professional Module 1
“Works performance on maintenance of conventional stations”

Scope of competence	Performance of works on maintenance of equipment of power stations with conventional and renewable energy
Name and code of the module	Works performance on maintenance of conventional stations
Purpose of the module	After studying this module the participant will be able to perform maintenance work on equipment of conventional stations
Level of professional qualification	3
Learning outcomes by module	<ol style="list-style-type: none"> 1. To determine the types of equipment of traditional stations 2. To perform maintenance work on transformers, switchgears and switching devices 3. To perform maintenance work on air and cable lines, buses and insulators
Summary of contents	<ol style="list-style-type: none"> 1. Characteristics of the types of equipment of traditional stations 2. Understanding the principles of maintenance of equipment of traditional stations 3. Determination of the types of equipment of a traditional station 4. Preparation of tools and materials 5. Compliance with the rules of safety and labor protection during the maintenance of transformers, switchgear and switching devices 6 Maintenance of transformers, switchgears and switching devices. 7. Preparation of tools and materials 8. Compliance with safety regulations and labor protection during maintenance 9. Maintenance of overhead and cable lines, tires and insulators.
Prerequisites	Physics Mathematics Fundamentals of Informatics and

	computing
Discipline that form the module	Theoretical foundations of electrical engineering Fundamentals of technical mechanics Electrical machines and transformers Electrical measurements Electrotechnical materials Computer Technology Basics Engineering graphics Labor and environmental protection
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 educational process organization	Lecture, SRSP, practical lessons, labs, practice
Teaching methods	Oral questioning, testing, report, summary, creative task, situational tasks
Forms of control	Pass fail exam, exam
Required resources	Whiteboard videos and posters on Safety Measures, tools for maintenance of electrical equipment, power transformers, breakers and switchgear types, G.F. Bystritsky Basics of energy, 2016. V.G. Rodionov Energy: problems of the present and the future possibilities, 2010.
Language of instruction	Kazakh, Russian
Post-requisites	Operation, repair and commissioning of electrical equipment for renewable energy sources; Power supply of industrial enterprises; Organization of electricity metering system of renewable energy sources

4.8 Specification of Professional Module 2
“Works performance on maintenance of equipment of renewable energy sources”

Scope of competence	Performance of works on maintenance of equipment of power stations with conventional and renewable energy
Name and code of the module	Works performance on maintenance of equipment of renewable energy sources
Purpose of the module	After studying this module the participant will be able to perform equipment maintenance renewable sources of energy
Level of professional qualification	3
Learning outcomes by module	<ol style="list-style-type: none"> 1. To identify types of renewable energy equipment 2. To perform maintenance work on renewable energy systems
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Characteristics of the types of equipment renewable energy sources 2. Understanding the principles of maintenance of renewable energy equipment 3. Identification of types of renewable energy equipment 4. Compliance with the rules of safety and labor protection when performing work on the maintenance of renewable energy systems 5. Conducting preparatory work on the maintenance of renewable energy systems 6. Knowledge of technologies for servicing renewable energy systems 7. Maintenance of renewable energy systems
Prerequisites	Theoretical bases of electrical engineering Electric machines and transformers Electrical measurements Electrical materials Environmental and safety Protection
Discipline that form the module	Electrical renewable energy systems
Module type (mandatory, optional)	mandatory
Labor intensity (credit /academic	13credits / 390 hours

hours)	
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Form of educational process organization	Lecture, independent work, practical lessons, labs, practice
Teaching methods	Oral questioning, testing, report, summary, creative task, situational tasks
Forms of control	Pass fail exam, exam
Required resources	Whiteboard videos and posters on Safety Measures, tools for maintenance of electrical equipment RES, Volker Kuashning Systems of renewable energy sources, 2013, V.V.Denisov, V.V. Gutenev, Non-conventional and renewable sources of energy. 2015., A.B. Alhasov Renewable sources of energy. 2012., Laboratory for RES.
Language of instruction	Kazakh, Russian
Post-requisites	Not conventional and renewable sources of energy

4.9 Specification of Professional Module 3
“Works organization in the choice and implementation of renewable energy sources”

Scope of competence	Performance on the selection and installation of equipment and renewable energy systems
Name and code of the module	Organization of work in the choice and implementation of renewable energy sources
Purpose of the module	After studying this module the participant will be able to organize works on the selection and introduction of renewable energy sources
Level of professional qualification	3
Learning outcomes by module	<ol style="list-style-type: none"> 1. To define renewable energy resources in the Republic of Kazakhstan 2. To choose types of renewable energy sources on regional characteristics 3. To carry out organizational work to promote renewable energy sources
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Characteristics of renewable energy resources in the Republic of Kazakhstan 2. Understanding of the importance of renewable energy sources 3. Defining of renewable energy sources 4. Economic and geographic characteristics of the regions of the Republic of Kazakhstan 5. Accounting for regional differences when choosing renewable energy sources 6. Identification of the region and type of renewable energy source 7. Defining of organizational work and estimated cost 8. Work plan for the implementation of renewable energy sources 9. Organizational work on renewable energy

Prerequisites	Electrical renewable energy systems
Disciplines that form the module	Non-conventional and renewable sources of energy.
Module type (mandatory, optional)	mandatory
Labor intensity (credit /academic hours)	6 credits / 180 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Form of educational process organization	Lecture, independent work, practical lessons, labs, practice
Teaching methods	Oral questioning, testing, report, summary, creative task, situational tasks
Forms of control	Pass fail exam, exam
Required resources	Whiteboard videos and posters on Safety Measures, tools for maintenance of electrical equipment RES, Volker Kuashning Systems of renewable energy sources, 2013, V.V.Denisov, V.V. Gutenev, Non-conventional and renewable sources of energy. 2015., A.B. Alhasov Renewable sources of energy. 2012., Laboratory for RES.
Language of instruction	Kazakh, Russian
Post-requisites	Environmental and safety protection Electrical renewable energy systems

4.10 Specification of Professional Module 4 “Installation of renewable energy systems”

Scope of competence	Performance on the selection and installation of equipment and renewable energy systems
Name and code of the module	Installation of renewable energy systems
Purpose of the module	After studying this module the participant will be able to work on the selection and installation of equipment and renewable energy systems
Level of professional qualification	3
Learning outcomes by module	<ol style="list-style-type: none"> 1. To identify equipment systems for installing renewable energy sources 2. To install a renewable energy system 3. To perform commissioning - the system of renewable energy sources
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Determination of types of materials and tools for installation of equipment 2. Formulation of safety regulations when installing equipment renewable energy systems 3. Defining of equipment for renewable energy systems 4. Technical characteristics of renewable energy equipment 5. Application of safety instructions for installation work. 6. Installing a renewable energy system 7. Control of installed devices and equipment of renewable energy sources 8. Application of safety rules during commissioning. 9. Evaluation of plant components and devices for the conversion of energy from renewable sources 10. Performing commissioning works in renewable energy systems in accordance with the rules.
Prerequisites	Non-conventional and renewable sources of energy.

Discipline that form the module	Environmental and safety protection Electrical renewable energy systems
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 educational process organization	Lecture, independent work, practical lessons, labs, practice
Teaching methods	Oral questioning, testing, report, summary, creative task, situational tasks
Forms of control	Pass fail exam, exam
Required resources	Whiteboard videos and posters on Safety Measures, tools for maintenance of electrical equipment RES, Volker Kuashning Systems of renewable energy sources, 2013, V.V.Denisov, V.V. Gutenev, Non-conventional and renewable sources of energy. 2015., A.B. Alhasov Renewable sources of energy. 2012., Laboratory for RES.
Language of instruction	Kazakh, Russian
Post-requisites	Environmental and safety protection Installation and commissioning of electrical equipment, renewable energy Electrical renewable energy systems

4.11 Specification of Professional Module 5
“Technical inspection of renewable energy systems”

Scope of competence	Inspection, repair and operation of renewable energy systems
Name and code of the module	Technical inspection of renewable energy systems
Purpose of the module	After studying this module the participant will be able to carry out inspection, repair and operation of renewable energy systems
Level of professional qualification	3
Learning outcomes by module	<ol style="list-style-type: none"> 1. To determine the types of work on the installation and dismantling of renewable energy systems 2. To determine the technical requirements for the installation and dismantling of renewable energy systems 3. To perform work on the installation and dismantling of equipment for renewable energy systems
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Formulation of safety regulations when carrying out installation and dismantling 2. Defining of materials and tools for installation and dismantling works 3. Identification of works on installation and dismantling of renewable energy systems 4. Formulation of technical requirements for the observance of the installation and dismantling of renewable energy systems 5. Description of works on conducting of Assembly and disassembly of renewable energy systems 6. Identification of specialized Brigade enterprises or specialized adjusting organization 7. Use of safety regulations during installation and dismantling 8. Performance of works on installation and dismantling equipment, renewable energy systems 9. Replacement of renewable energy systems
Prerequisites	Electrical renewable energy systems
Discipline that form the module	Environmental and safety protection Installation and commissioning of electrical equipment, renewable energy

	Electrical renewable energy systems
Module type (mandatory, optional)	mandatory
Labor intensity (credit /academic hours)	11 credits / 330 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Form of educational process organization	Lecture, independent work, practical lessons, labs, practice
Teaching methods	Oral questioning, testing, report, summary, creative task, situational tasks
Control Forms	Pass fail exam, exam
Required resources	Whiteboard videos and posters on Safety Measures, tools for works performance on installation and dismantling equipment, renewable energy systems, Volker Kuashning Systems of renewable energy sources, 2013, V.V.Denisov, V.V. Gutenev, Non-conventional and renewable sources of energy. 2015., A.B. Alhasov Renewable sources of energy. 2012., Laboratory for RES.
Language of instruction	Kazakh, Russian
Post-requisites	Practice Industrial training. Environmental and safety Protection Maintenance, repair and adjustment of electrical energy from renewable sources Electrical renewable energy systems Basics of industrial electronics. Relay protection and electrical automation

4.12 Specification of Professional Module 6
“Implementation of work on the operation of an electricity generation station based on renewable energy”

Scope of competence	Inspection, repair and operation of renewable energy systems
Name and code of the module	Implementation work on the operation of an electricity generation station based on renewable energy
Purpose of the module	After studying this module the participant will be able to carry out inspection, repair and operation of renewable energy systems
Level of professional qualification	3
Learning outcomes by module	<ol style="list-style-type: none"> 1. To determine the types of work on the operation of renewable energy systems. 2. To perform performance monitoring 3. To carry out work on the operation of the power plant based on renewable energy sources
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Defining tools for equipment operation 2. Formulation of safety rules for equipment operation 3. Determination of types of work on the operation of renewable energy systems 4. Verification of the performance of each part of the system (its equipment or components) 5. Checking of the performance of the entire system 6. Verification of compliance of the actual characteristics of the equipment with the characteristics specified in the contract 7. Definition of technical requirements 8. Application of safety rules for operation of solar systems and wind generators 9. Operation of Solar Equipment and Wind Generators 10. Operation of biomass equipment, geothermal station and modern type batteries
Prerequisites	Environmental and safety Protection Installation and commissioning of electrical equipment, renewable energy

	Electrical renewable energy systems
Discipline that form the module	Teaching-study practice Industrial training. Environmental and safety Protection Maintenance, repair and adjustment of electrical energy from renewable sources Electrical renewable energy systems Basics of industrial electronics. Relay protection and electric automation
Module type (mandatory, optional)	mandatory
Labor intensity (credit /academic hours)	9 credits / 270 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Form of educational process organization	Lecture, independent work, practical lessons, labs, practice
Teaching methods	Oral questioning, testing, report, summary, creative task, situational tasks
Forms of control	Pass fail exam, exam
Required resources	Whiteboard videos and posters on TB, tools for repairs of renewable energy systems, Volker Kuashning Systems of renewable energy sources, 2013, V.V.Denisov, V.V. Gutenev, Non-conventional and renewable sources of energy. 2015., A.B. Alhasov Renewable sources of energy. 2012., A.Ye. Copylov Economics of Renewable Energy. 2015. Laboratory for RES
Language of instruction	Kazakh, Russian
Post-requisites	Maintenance, repair and adjustment of electrical energy from renewable sources

4.13 Specification of Professional Module 7
“Perform work on repair and adjustment of renewable energy systems”

Scope of competence	Inspection, repair and operation of renewable energy systems
Name and code of the module	Perform work on repair and adjustment of renewable energy systems
Purpose of the module	After studying this module the participant will be able to carry out inspection, repair and operation of renewable energy systems
Level of professional qualification	3
Learning outcomes by module	<ol style="list-style-type: none"> 1. To determine the types of work on the repair and commissioning of renewable energy systems 2. To determine the technical requirements for the repair and commissioning of renewable energy systems 3. To perform work on the repair and adjustment of renewable energy systems
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Preparation of the workplace in accordance with the requirements of labor protection 2. Defining types of repair 3. Determine the types of work on the repair and commissioning of renewable energy systems 4. Formulation of technical requirements for the repair and adjustment of renewable energy systems 5. Description of work on the repair and commissioning of renewable energy systems 6. Determination of the composition of the specialized brigade of the enterprise or specialized setup organization 7. Application of safety regulations when setting up equipment 8. Performance of adjustment works. 9. Performing verification work
Prerequisites	Teaching-study practice Industrial training. Environmental and safety Protection Maintenance, repair and adjustment of electrical energy from renewable sources Electrical renewable energy systems

	Basics of industrial electronics. Relay protection and electric automation
Discipline that form the module	Maintenance, repair and adjustment of electrical energy from renewable sources
Module type (mandatory, optional)	mandatory
Labor intensity (credit /academic hours)	8 credits / 240 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Form of educational process organization	Lecture, independent work, practical lessons, labs, practice
Teaching methods	Oral questioning, testing, report, summary, creative task, technical dictation, situational tasks
Forms of control	Pass fail exam, exam
Required resources	Whiteboard videos and posters on TB, tools for repairs of renewable energy systems, Volker Kuashning Systems of renewable energy sources, 2013, V.V.Denisov, V.V. Gutenev, Non-conventional and renewable sources of energy. 2015., A.B. Alhasov Renewable sources of energy. 2012., A.Ye. Copylov Economics of Renewable Energy. 2015. Laboratory for RES
Language of instruction	Kazakh, Russian
Post-requisites	Power supply of industrial enterprise Organization of electricity metering system of renewable energy

4.14 Specification of Professional Module 8 “Works on electricity supply to electrical networks and electrical equipment of renewable energy sources”

Scope of competence	Electricity, management and control of operation of electrical networks and electrical renewable energy
Name and code of the module	Works on electricity supply to electrical networks and electrical equipment of renewable energy sources
Purpose of the module	After studying this module the participant will be able to perform works by electricity, management and control of operation of electrical networks and electrical renewable energy
Level of professional qualification	3
Learning outcomes by module	<ol style="list-style-type: none"> 1. To determine the types of work on the power supply of electrical networks and electrical equipment of renewable energy sources 2. To carry out work on the power supply of electrical networks and electrical equipment of renewable energy sources 3. To analyze energy efficiency using renewable energy
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Reading the power supply scheme of electrical networks of renewable energy sources 2. Characteristics of electrical equipment of electrical networks of power supply of renewable energy sources 3. Determination of types of work on the power supply of electrical networks and electrical equipment of renewable energy sources 4. Identification of consumers of electricity on reliability 5. Determination of the classification of electricity receivers according to the required degree of uninterrupted power supply and operating mode 6. Performance of work on the power supply of electrical networks and electrical equipment of renewable energy sources 7. Technical characteristics of renewable energy equipment 8. Types of tariffs 9. The calculation of the cost of production in 1

	kW * hour
Prerequisites	Maintenance, repair and adjustment of electrical energy from renewable sources
Discipline that form the module	Power supply of industrial enterprise Organization of electricity metering system of renewable energy
Module type (mandatory, optional)	mandatory
Labor intensity (credit /academic hours)	7 credits / 210 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Form of educational process organization	Lecture, independent work, practical lessons, labs, practice
Teaching methods	Oral questioning, testing, report, summary, creative task, situational tasks, technical dictation
Forms of control	Pass fail exam, exam
Required resources	Whiteboard, videos and posters, Volker Kuashning Systems of renewable energy sources, V.V.Denisov, V.V. Gutenev, Non-conventional and renewable sources of energy, A.B. Alhasov Renewable sources of energy, A.Ye. Copylov Economics of Renewable Energy. Laboratory for RES
Language of instruction	Kazakh, Russian
Post-requisites	Network management of power supply and connection of renewable energy sources Organization of electricity metering system of renewable energy

4.15 Specification of Professional Module 9
“Management and control of operation of electrical networks and electrical renewable energy”

Scope of competence	Electricity, management and control of operation of electrical networks and electrical renewable energy
Name and code of the module	Management and control of operation of electrical networks and electrical renewable energy
Purpose of the module	After studying this module the participant will be able to perform works by electricity, management and control of operation of electrical networks and electrical renewable energy
Level of professional qualification	3
Learning outcomes by module	<ol style="list-style-type: none"> 1. To manage the power supply networks of renewable energy sources 2. To account the availability and status of renewable energy sources 3. To organize and systemize electricity metering of renewable energy sources
Summary of content (sections, topics)	<ol style="list-style-type: none"> 1. Description of electrical power networks of electricity of renewable energy 2. Application of technical means of control for renewable energy installations 3. Application of an automatic system of accounting, control and manage power consumption 4. Carrying out organizational work to eliminate faults at stations and renewable energy transmission lines 5. Performance of accounting and control energy consumption to a renewable energy installations 6. Selection of the necessary equipment for renewable energy sources, depending on technical requirements 7. Characterization by technical means of metering for renewable energy installations 8. Characterization of the counter types and specifications 9. Understanding of the scheme of inclusion of counters to your network

Prerequisites	Power supply of industrial enterprise Organization of electricity metering system of renewable energy
Discipline that form the module	Network management of power supply and connection of renewable energy sources Organization of electricity metering system of renewable energy
Module type (mandatory, optional)	mandatory
Labor intensity (credit /academic hours)	5 credit / 150 hours
Duration of the module	3-8 semester
Form of training	Full-time
Education technology	Modular
Form of educational process organization Teaching methods	Lecture, independent work, practical lessons, labs, practice Oral questioning, testing, report, summary, creative task, technical dictation, situational tasks
Control Forms	Pass fail exam, exam
Required resources	Whiteboard videos and posters Volker Kuashning Systems of renewable energy sources, 2013, V.V.Denisov, V.V. Gutenev, Non-conventional and renewable sources of energy. 2015., A.B. Alhasov Renewable sources of energy. 2012., A.Ye. Copylov Economics of Renewable Energy. 2015.
Language of instruction	Kazakh, Russian
Post-requisites	

EDUCATIONAL PROCESS PLAN

Code and the education profile: 0900000 – Energy
 Specialty: 0918000 – “Renewable energy”
 Qualification: 091801 3 – “Power Engineering Technician”

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

Code module	The name cycles disciplines/modules, practices	Credit	Differential pass fail exam	Exam	The amount of training time (watches)				Distribution of semester	
					TOTAL	From them:				
						Theoretical training	Practical training *	Industrial training		Individual training
GED	General Education Disciplines	48			1448	1448			1-4	
BM	Basic modules	30			900	480	-	360	60	3-8
BM 1	Application of professional vocabulary, drafting of official papers in the field of professional activity	6	+	+	180	90		60	30	3-8
BM 2	Application of frameworks in philosophical knowledge, social sciences for socialization and	6	+		180	180	-	-	-	3-8

	adaptation in the society and the work collective									
BM 3	Understanding of the history, role and place of Kazakhstan in the world community, respectful and careful attitude towards important historical heritage and cultural traditions	4		+	120	120	-	-	-	3-8
BM 4	Application of basic knowledge of economy and knowledge of labor legislation and legal norms for the protection of their rights in professional activity	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 with the use of applications	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	3-8
PM 1	Maintenance of equipment of traditional stations	14	+	+	420	90	240	60	30	3-8
PM 2	Renovation of renewable energy equipment	13	+	+	390	90	180	90	30	3-8
PM 4	Installation and dismantling of renewable energy systems	10	+	+	300	90	150	60	-	3-8
PM 5	Maintenance of equipment of traditional stations	11	+	+	330	90	150	60	30	3-8
PM	Professional modules for mid-level specialist qualifications (including in-service training	35			1050	330	420	210	90	3-8

	and professional practice)									
PM 3	Organization of work on the selection and implementation of renewable energy sources	6	+	+	180	60	30	60	30	3-8
PM 6	Performance of work on operation of the power generating station based on renewable energy sources	9	+	+	270	60	150	30	30	3-8
PM 7	Repair and adjustment of renewable energy systems	8	+	+	240	60	120	30	30	3-8
PM 8	Performance of work on the power supply of electrical networks and electrical equipment of renewable energy sources	7	+	+	210	60	90	60	-	3-8
PM 9	Management and control of operation of electrical networks and electrical equipment of renewable energy sources	5	+	+	150	90	30	30	-	3-8
	Subtotal:	161			4838	2618	1140	840	240	
PP	Pre-diploma practice	10			300		300			8
DP 01	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 classes	14			420	420				1-8
	Total:	219			6588	3978	1440	840	330	

Note:

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

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