

**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)

Professional Qualification Level: Applied Bachelor

Duration of training: 2 years 10 months.

Astana, 2018

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INTRODUCTION

This educational program majoring “0918000 - Renewable energy” is developed in accordance with the State compulsory education standard of post-secondary education, approved by the Government Decree of the Republic of Kazakhstan dated August 23, 2012 No. 1080; the 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 dated September 24, 2012 No. 373-o-m and the Minister of education and science of the Republic of Kazakhstan dated September 28, 2012 No. 444); Sectorial Qualifications framework in the field of “Power Industry”, approved by the Protocol dated November 17, 2016, No. 12-03-333; Project Professional standard “Electrical power stations and networks (by types), developed by Legal Entities Association “Kazakhstan Association of oil-gas and energy sector organizations “KAZENERGY”, version 1, 2015, the date of indicative revision is 2018 and, subject to the order of the Minister of education and science of the Republic of Kazakhstan dated October 31, 2017 No. 553 “On approval of model curricula and model academic plans on specialties in technical and vocational education”.

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.

Developed education program allows you to organize the educational process with the use of credit technology of training.

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

Abbreviations and symbols

BC	Basic competence
BM	Basic module
SCES	The State compulsory education standard
EQF	European qualification frame
K&S	Knowledge & skills
NCO	National classifier of occupations
NQF	National Qualifications framework
NQS	National qualifications system
GCEA	General classifier of types of economic activity
GM	General module
EP	Educational program
SQF	Sectorial Qualifications framework
PS	Professional standard
PC	Professional competence
PM	Professional module
WG	Working Group
RK	The Republic of Kazakhstan
TO	Training outcome
TVET	Technical and vocational education and training
TVET&PSE	Technical and Vocational Education and Post-Secondary Education
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 OF THE WORKING EDUCATION PROGRAM

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

Name and code: 0918024 - “Applied Bachelor of renewable energy”

The purpose of the education program: Training of a specialist in a new formation with broad fundamental knowledge, initiative, carrying out work on the organization and control of maintenance, operation and repair of electrical equipment for renewable energy sources

Level of education: post-secondary education

Level of professional qualification: Applied undergraduate

Skill levels on NQF/SQF: 5

Professional Area activity *: Energy. Electricity.

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

- Implementation of works on the selection of renewable energy sources
- Works organization on studying the introduction of renewable energy sources
- Technical inspection, repair and operation of renewable energy sources
- Power supply, management and control of operation of electrical networks and electrical equipment of renewable energy sources
- Diagnosis, research and evaluation of renewable energy sources

Object(s) of professional activity (*by NOC, the initial group*) ***: power plants, energy companies, renewable energy objects

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

Form of study: full-time.

Training terms: 2 years, 10 months.

Language of training: State (Kazakh) and Russian

Volume of credits/hours: 165 credits /4650 h

Requirements for students * persons with: General 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

<p>The aim of the training: work performance for the Organization and supervision of maintenance, operation and repair of electrical equipment renewable sources of energy</p>	<p>The outcome: after completing the training program, the participant will be able to perform works on the development, planning, organizing of tests, construction, installation, maintenance of electrical equipment of renewable sources of energy</p>	
<p>Section names, section, group, class and subclass according to NACE * (SAR)</p>	<p>Section D : Electricity supply, gas, steam supply and air conditioning Section [35] : Electricity supply, gas, steam supply and air conditioning Group [351] : Production, transmission and distribution of electricity: Class [3511] : Production of electricity</p>	
<p>Scope of competences (<i>on core labor functions of professional standard or analysis profession</i>) **</p>	<p>A. work for selection of renewable energy sources B. Works organization to study the introduction of renewable energy sources C. Works organization to study introduction of renewable energy sources D. Electricity, management and control of operation of electrical networks and electrical equipment of renewable energy sources E. Diagnostics, research and evaluation of renewable energy sources F. Analysis and control of work modes of renewable energy sources and perform a basic type of work for applied Bachelor's degree</p>	
<p>List of competencies and modules in the context of an academic degree/qualifications/vocations</p>		
<p>Competence Code</p>	<p>Competence (in line with labor functions and skill levels)</p>	<p>Modules</p>
<p>Professional competence</p>		
<p>PC 1</p>	<p>Perform work on the selection of renewable energy sources</p>	<p>PM 1. Execution of work on the selection of renewable energy sources</p>
<p>PC 2</p>	<p>Technical inspection, operation and modernization of renewable energy sources</p>	<p>PM 2 Works on the technical inspection, operation and modernization of</p>

		renewable energy sources
PC 3	Organization of work on the study of the introduction of renewable energy sources	PM 3. Organization of work on the study of the introduction of renewable energy sources
PC 4	Perform power supply, management and control of operation of electrical networks and electrical equipment of renewable energy sources	PM 4. Power supply, management and control of operation of electrical networks and electrical equipment of renewable energy sources
PC 5	Perform Diagnostics, research and evaluation of renewable energy sources	PM 5. Diagnostics, research and evaluation of renewable energy sources
PC 6	Perform Analysis and management of work modes of renewable energy sources	PM 6. Analysis and management of work modes of renewable energy sources
Basic Competence		
BC 1	Apply professional vocabulary, draw up and execute business documents in the field of activity for solving problems of interpersonal and intercultural interaction	BM 01. The use of professional vocabulary, the preparation of business papers in the field of professional activity
BC 2	Understand the history, roles and places of Kazakhstan in the world community, respectful and caring attitude to historical heritage and cultural traditions	BM 02. Understanding of history, the role and place of Kazakhstan in the world community
BC 3	Maintain and develop an adequate level of physical fitness to ensure full social and professional activities	BM 03. The development and improvement of physical qualities
BC 4	To use the basics of philosophical knowledge, to realize oneself and one's place in society, to tolerate social, political, ethnic, confessional and cultural development.	BM 04. Application of the foundations of philosophical knowledge, social sciences for socialization and adaptation in society and the workforce.
BC 5	Understand the basic laws and	BM 05. Application of

	mechanisms of the functioning of the modern economic system	the basic knowledge of the economy and knowledge of labor law and regulations to protect their rights in their professional activities
BC 6	Perform sketches, diagrams and drawings, read the technological documentation, use the application packages of the development of design and technological documentation.	BM 06. Execution, execution, reading of design and technological documentation using application programs

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

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

LIST OF MODULES AND LEARNING OUTCOMES

Module name	Learning outcomes (in accordance with the professional tasks)	Assessment Criteria of learning outcomes	Disciplines forming the module
Professional modules			
PM 1. Execution of work on the selection of renewable energy sources	LO 1. Demonstrate knowledge of the basic laws and characteristics of electrical circuits.	1. Characteristic of electric and magnetic fields	Theoretical foundations of electrical engineering Fundamentals of technical mechanics Electrical machines and transformers Electric meekness Electrotechnical materials Computer Technology Basics Engineering graphics
		2. Determination of the basic laws and properties of electric, magnetic circuits in solving professional problems	
		3. Differences in the characteristics of DC and AC circuits, linear and non-linear circuits.	
	LO 2. To apply the laws of mechanical movement in the operation of renewable energy equipment	1. Determination of the reaction of a flat and spatial system of forces, work, power and efficiency of renewable energy	
		2. Performing strength calculations for various types of deformation	
		3. Performing strength analysis of machine parts	
	LO 3. To apply in professional activity knowledge of structures, the principle of	1. Characteristic purpose, classification, scope, design and principle of operation of electric DC machines.	

	operation of electrical machines and transformers	2. Explanation of devices, modes of operation and the principle of operation of synchronous and asynchronous machines.	
		3. Characteristic purpose, classification, scope, design and principle of operation of transformers	
	LO 4.To modernize electrical equipment parts	1. Using the rules of design and reading general drawings and assembly drawings in the work	
		2. Conducting basic technical measurements	
3. Characteristics of electrical materials used in renewable energy sources			
		4. Using the application package for the development of design documentation	
PM 2. Work on the technical inspection,	LO 1. Maintenance of electrical equipment and	1. Understanding and reading simple circuits of typical electronic equipment	Scholastic - meaningful practice Training

operation and modernization of renewable energy sources	lighting network of RES	2. Selection of types and operation of electronic devices and electrical equipment, depending on the characteristics of their application	Occupational Safety and Health. Operation, repair and adjustment of electrical equipment of electrical networks Electrical equipment of power lines and substations Basics of industrial electronics Relay Protection
		3. Calculation of electric lighting with the use of renewable energy	
	LO 2. To make a choice of electrical equipment of substations and distribution networks of renewable energy sources.	1. Information on basic information about energy systems of RES	
		2. Characteristics of the choice of a substation scheme, design features of electrical equipment of power plants and substations of renewable energy sources.	
		3. Calculation of electrical networks, the choice of devices and current-carrying parts for RES	
	LO 3. To make a selection of electrical equipment of power lines RES	1. Knowledge in the field of application of various types of power lines RES	
		2. Characteristics of supports, wires and structural elements of overhead power lines and equipment of cable power lines of	

		renewable energy sources	
		3. Execution of the calculation of overhead power lines of renewable energy	
	LO 4. To carry out the organization of operation of electrical equipment for renewable energy sources	1. Selection of technological equipment during the operation of electrical and electromechanical equipment of renewable energy	
		2. Registration of technical documentation for the operation of electrical and electro-mechanical equipment for renewable energy sources.	
		3. Implementation of switching in electrical installations according to the principle schemes of renewable energy sources	
		4. Organization of safe operation and maintenance of mounted electrical equipment RES	
PM 3. Organization of work on the study of the introduction of renewable energy sources	LO 1. To use wind power to produce electricity	1. The difference in the characteristics of wind energy resources in the regions of Kazakhstan.	Nontraditional and renewable energy sources. Low-waste and resource-saving technologies in the energy sector. Energy and environment
		2. Characteristics of the types of wind power plants.	

	<p>3. Explanation of the design of wind turbines and wind farms, the dependence of wind power from wind speed and wind wheel diameter.</p> <p>4. Performance of the calculation of the ideal and real wind turbine</p>	<p>common environment. Hydropower teak and integrated use of water resources</p>
<p>LO 2.To use solar energy to produce electricity</p>	<p>1. Understanding the physical basis of solar energy conversion processes.</p>	
	<p>2. Explanation of the device, operating modes and principle of operation of machineless solar energy converters and photoelectric converters</p>	
	<p>3. Formulation of types of reservoirs, principles of their operation and methods of calculation</p>	
<p>LO 3.To use hydroelectric power for electricity production</p>	<p>1. Types of hydrogenerators and their features, principles of their operation and methods of calculation</p>	
	<p>2. Definition of communication and interaction with the power system</p>	

		3. Determination of the impact of hydropower construction on the environment	
	LO 4.To use geothermal energy to produce electricity	1. Determination of the thermal regime of the earth's crust.	
		2. Characteristics of the source of geothermal heat, environmental performance of geothermal thermal power plants	
		3. Determination of methods and methods of using geothermal heat for electricity generation and in heat supply systems	
	LO 5. To use secondary energy resources	1. The concept of secondary energy resources.	
		2. Formulation of ways of using and transforming VER in industry and housing and communal services	
		3. Explanation of devices, operating modes and principle of operation of heat pumps	
PM 4. Power supply, management and control of operation of electrical networks and	LO 1.To produce management of electricity networks of renewable energy sources.	1.Characteristics of the structure of automatic and dispatching control facilities and electrical equipment of electrical networks	Power supply network management and RES communication Organization of electricity metering

electrical equipment of renewable energy sources		of electricity supply RES	system for RES Power supply of renewable energy facilities
		2. Use of technical means of dispatching control at RES facilities.	
	LO 2. To organize and systemize accounting for electricity metering of RES.	1. Characteristics of technical means of electricity metering at renewable energy facilities and technical characteristics of meters	
		2. The use of automatic metering systems, control and management of electricity consumption (AMR)	
		3. Performance of accounting and control of electricity consumption at renewable energy facilities	
	LO 3. To calculate and select the electrical equipment of renewable energy sources.	1. The use of methods for determining the electrical loads of consumers of electrical energy RES	
		2. Classification of receivers of electricity according to the required degree of uninterrupted power supply and operating mode	
3. Performance of the			

		<p>calculation of electrical equipment of electrical networks and wiring products</p> <p>4. Determination of currents and voltages for various types of asymmetrical short circuits.</p> <p>5. Execution of electrical networks</p>	
<p>PM 5. Carrying out diagnostics, research and evaluation of renewable energy sources</p>	<p>LO 1.To carry out diagnostics of renewable energy sources</p>	<p>1. Calculation of the thermodynamic characteristics of the solar collector</p>	<p>Renewable energy sources Solar energy and other alternative energy sources. Renewable Energy Calculations</p>
		<p>2. Determination of the working parameters of the solar cell;</p>	
		<p>3. Calculation of the energy parameters of the turbine and wind turbine, the main parameters of the gas generator and the digester, the thermodynamic characteristics of the thermosyphon and the main parameters of the accumulating systems</p>	
		<p>4. Calculation of devices ensuring the use of renewable energy sources</p>	
	<p>LO 2.To organize the conservation and development of renewable energy</p>	<p>1. Determination of the origin and nature of the problem of energy conservation technology</p>	

		2. Formulation of the main factors of energy conservation efficiency	
		3. Programs for the development of alternative energy in Kazakhstan	
PM 6. Analysis and management of the mode of operation of renewable energy sources	LO 1.To analyze the modes of operation of renewable energy sources	1. Analyzing the trend of renewable energy sources	Automation of energy systems Alternative energy sources in building design Professional practice
		2. Implementation of the development of an efficient energy supply system based on renewable energy sources.	
		3. Performing automation of energy systems of renewable energy	
	LO 2. To manage the mode of operation of renewable energy sources	1. Perform the development of a methodology for the integrated assessment of the economic efficiency of power generation projects using renewable energy sources.	
		2. Implementation of the algorithm for assessing the economic efficiency of projects for the development of renewable energy sources	
		3. Carrying out with the help of this algorithm calculations for the conditions of Kazakhstan.	

LO 3. To carry out work on the organization of the work of the production unit for the technical operation, maintenance and repair of electrical and electromechanical equipment of RES facilities	1. Characterization of the process for the technical operation, maintenance and repair of electrical and electromechanical equipment for renewable energy sources.
	2. Application of management skills of a separate production unit
	3. Implementation of the organization of the work of the production unit for the technical operation, maintenance and repair of electrical and electromechanical equipment of renewable energy facilities
LO4. To carry out the collection of source material for the thesis design of renewable energy facilities.	1. Conducting the collection of source material for the degree design in accordance with the regulatory and technical documentation of renewable energy facilities and in accordance with the task for the diploma design.
	2. The use of skills with regulatory and technical documentation, reference books
LO 5. Perform	1. Compilation of

	calculations of the main technical and economic indicators of renewable energy facilities.	costing for the production and sale of energy generated by renewable energy facilities.
		2. Compilation of estimate documentation using regulatory reference literature
		3. Perform the calculation of the main technical and economic indicators of renewable energy facilities

Basic modules			
BM 1 Application professional vocabulary, preparation of business documents in the sphere of professional activity	LO1. To possess the grammar and terminology of the Kazakh (Russian) and foreign languages for communication in the sphere of their professional activities	1. Knowledge of the lexical and grammatical material in the specialty necessary for professional communication.	Professional Kazakh (Russian) language Professionally-oriented foreign language Outsourcing
		2. Application of terminology in the specialty.	
	LO2. 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 of the discussion topics and participation in its	

		discussion.	
	LO3. To work with organizational, administrative, information and reference documents using computer technologies	1. Drawing up in Kazakh (Russian) and foreign languages a resume, autobiography, description, statement, complaint, power of attorney, receipt	
		2. Compliance with the basic requirements for the text of the document.	
		3. Creation of documents on the computer that meet modern requirements and established regulations	
BM 2. Understanding the history, the role and place of Kazakhstan in the world community, respectful and caring attitude to historical heritage and cultural traditions	LO1. 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, Culturology
		2. Understanding the role and place of culture of the peoples of the Republic of Kazakhstan in world civilization.	
		3. Characteristics of the cultural achievements of independent Kazakhstan.	
	LO2. To understand the moral values and norms that form	1. Characteristic of the form, type and history of various	

	tolerance and an active personal position	cultures and civilizations ..	
	LO3. To understand the main historical events	2. Knowledge of history and understanding of the current state of the world and traditional religions.	
		3. Tolerant perception of social, ethnic, religious and cultural differences.	
		1. Knowledge of chronology and understanding of the essence of historical events that took place from antiquity to the present.	
		2. Disclosure of the role and place of the Kazakh people in the common Turkic community, in the system of a nomadic civilization, in the development of the historical and cultural community of the peoples of the Eurasian world.	
		3. Understanding the nature and purpose of the political and social changes taking place in the Republic of Kazakhstan after independence.	

		4. Characteristics of the achievement of an independent Kazakhstan.	
	LO4. To define causal relationships of historical events.	1. Determination of the main facts, processes and phenomena, reflecting and characterizing the integrity and consistency of the history of Kazakhstan.	
		2. Establishing links between historical events	
		3. Use of historical sources.	
BM 3. The development and improvement of physical qualities	LO1.To improve health and abide by the principles of a healthy lifestyle	1. Understanding the importance of physical culture for health promotion, the role of physical culture and sports in the development of the country	Modern history of Kazakhstan, Cultural studies
		2. Performing a set of exercises for general physical training	
		3. Application of the rule of a healthy lifestyle in everyday life	
	LO 2.To improve physical qualities and psycho-physiological abilities	1. Awareness of the exercise technique	
		2. Compliance with the rules of team sports	

		3. Application of the studied methods of games and individual tactical tasks in an educational game.	
		4. Implementation of control standards and tests provided by the program	
	LO3.To provide first aid for injuries and accidents	1. Understanding the causes of injuries during exercise, methods of injury prevention	
		2. Provision of first aid for injuries.	
		3. Estimation of the difficulty and risk arising during the execution of various physical activities, own and others physical capabilities	
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	LO1. To determine the ratio in the life of a person of such philosophical categories as freedom and responsibility, material and spiritual values.	1. Understanding the essence of social and ethical problems associated with the development and use of the achievements of science, 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	Fundamentals of Philosophy, Fundamentals of Sociology and Political Science

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

		modern society	
		3. Application of national traditions and customs of various countries in professional activities.	
	LO4.To understand the international political processes and geopolitical situation.	1. Understanding of the place and role of Kazakhstan in the modern world.	
		2. Characterization of the structure of the political system of the Republic of Kazakhstan.	
BM 5. Application of the basic knowledge of the economy and knowledge of labor laws and regulations to protect their rights in their professional activities	LO1. To determine the forms and types of ownership, types of plans, basic economic indicators of the enterprise	1. Performance of the necessary economic calculations using mathematical methods	Fundamentals of Economics Fundamentals of law
		2. Discussion of the main economic indicators of the enterprise	
		3. Carrying out measurements of the cost of working time to perform a certain work	
		4. Defining methods for reducing costs and increasing profitability.	
	LO 2. To understand the development trends of the world economy, the main objectives of the	1. Understanding the main objectives of the state's transition to a green economy	

	state's transition to a green economy	<p>2. The use of basic methods for calculating gross domestic product and gross national product</p> <p>3. Definition of global economic problems, ways to overcome them</p>	
	LO 3.To protect rights in accordance with labor laws	<p>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</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>	
BM 06. Execution, execution, reading of design and technological documentation using application programs	LO1.To follow the rules of design documentation	<p>1. Understanding of design documentation design rules.</p> <p>2. Making drawings according to the rules of a unified system of design documentation.</p> <p>3. Defining the purpose and scale of the drawing</p>	Engineering graphics. Computer design.

		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.

Specification of 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 the 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	5
Learning Outcomes by Module	<ol style="list-style-type: none"> 1. To know the grammar and terminology of the Kazakh (Russian) and foreign languages for communication in the sphere of their professional activities 2. To know the translation technique (with a dictionary) of professional-oriented texts 3. To work with organizational, administrative, information and reference documents using computer technologies.
Summary of Content (sections, themes)	<ol style="list-style-type: none"> 1. Knowledge of the lexical and grammatical material in the specialty necessary for professional communication. 2. Independent preparation of coherent, logical reasoned statements in accordance with the proposed topic. 3. Understanding of the discussion topics and participation in its discussion. 4. Reading and translation (with a dictionary) of professional texts 5. Drawing up in Kazakh (Russian) and foreign languages a resume, autobiography, description, statement, complaint, power of attorney, receipt 6. Compliance with the basic requirements for the text of the document 7. Creation of documents on the computer that meet modern requirements and established regulations
Prerequisites	School program: Kazakh (Russian)

	language, foreign language
Module forming disciplines	Professional Kazakh (Russian) language, Professional foreign language, Professionally-oriented foreign language, Office work in the state language
Module type (mandatory, optional)	Mandatory
Labor intense (credits /academic hours)	6 credits/180 hours
Duration of the module	1-5
Form of teaching	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	Necessary resources library fund, Internet classes, standard educational, electronic educational resources
Language of instruction	Kazakh, Russian
Post-requisites	Professional modules

Specification of Basic Module 2
“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	-
Name and code of the module	Understanding of the history, role and place of Kazakhstan in the world community, respectful and caring attitude to historical heritage and cultural traditions
Purpose of the module	After studying the module, the student will be able to understand the history, role and place of Kazakhstan in the world community.
Level of professional qualification	5
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 define the causal relationships of historical events.
Summary of Content (sections, themes)	<ol style="list-style-type: none"> 1. Knowledge of the history of national culture, the values of traditional Kazakh culture. 2. Understanding the role and place of culture of the peoples of the Republic of Kazakhstan in world civilization. 3. Characteristics of the cultural achievements of an independent Kazakhstan. 4. Characteristic of the form, type and history of various cultures and civilizations 5. Knowledge of history and understanding of the current state of the world and traditional religions. 6. Tolerant perception of social, ethnic, confessional and cultural differences. 7. Knowledge of chronology and understanding of the essence of historical

	<p>events from antiquity to the present.</p> <p>8. Disclosure of the role and place of the Kazakh people in the common Turkic community, in the system of nomadic civilization, in the development of the historical and cultural community of the peoples of the Eurasian world.</p> <p>9. Understanding the nature and purpose of the political and social changes taking place in the Republic of Kazakhstan after independence.</p> <p>10. Characteristics of the achievement of an independent Kazakhstan.</p> <p>11. Defining the main facts, processes and phenomena, reflecting and characterizing the integrity and consistency of the history of Kazakhstan.</p> <p>12. Establishing links between historical events.</p> <p>13. Use of historical sources.</p>
Prerequisites	School program: history, People and society, foundations of law
Module forming disciplines	Modern history of Kazakhstan, Cultural studies
Module type (mandatory, optional)	Mandatory
Labor intense (credits /academic hours)	4 credit/ 120 hours
Duration of the module	1-2
Form of teaching	Full-time
Teaching methods	Traditional teaching methods-lectures, practical exercises, methods of teaching, interactive teaching methods
Control Forms	Pass fail exam, exam
Required Resources	Library Fund, online classes, e-training resources
Language of instruction	Kazakh, Russian
Post-requisites	Basics of philosophy, foundations of sociology and political science

Specification of Basic Module 3
"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 the module, the student will be able to maintain and develop an appropriate level of physical fitness to ensure a full-fledged social and professional activity.
Level of professional qualification	5
Learning Outcomes by Module	<ol style="list-style-type: none"> 1. To promote health and abide by the principles of a healthy lifestyle 2. To improve physical qualities and psycho-physiological abilities 3. To provide first aid for injuries and accidents.
Summary of Content (sections, themes)	<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 injuries during exercise, methods of injury prevention 9. Provision of first aid for injuries. 10. Assessment of difficulties and risks arising during the execution of various physical activities, own and others physical capabilities
Prerequisites	Knowledge of school course physical

	education
Module forming disciplines	Physical education
Module type (mandatory, optional)	Mandatory
Labor intense (credits /academic hours)	6 credit/ 180 hours
Duration of the module	1-6
Form of teaching	Full-time
Teaching methods	Practical work
Control Forms	Pass/fail exam, exam
Required Resources	Gymnasium and sports equipment
Language of instruction	Kazakh, Russian
Post-requisites	Sports Groups for Improvement

Specification of Basic Module 4

"Application of the foundations of philosophical knowledge, social sciences for socialization and adaptation in society and the workforce"

Scope of competence	-
Name and code of the module	Application of the basics of philosophical knowledge, social sciences for socialization and adaptation in society and the workforce
Purpose of the module	After studying the module, the student will be able to use the basics of philosophical knowledge, recognize himself and his place in society, tolerate social, political, ethnic, religious and cultural development.
Level of professional qualification	5
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.
Summary of Content (sections, themes)	<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 for analyzing 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 current issues problems and prospects development, etc.

	<p>6. The use of social, moral and legal norms governing the attitude of a person towards a person, society, environment</p> <p>7. Understanding the role and place of culture of the peoples of the Republic of Kazakhstan in the world civilization</p> <p>8. The use of approaches and methods of critical analysis in relation to various cultural forms and processes of modern society</p> <p>9. Application of national traditions and customs of various countries in professional activities.</p> <p>10. Understanding the place and role of Kazakhstan in the modern world.</p> <p>11. Characteristics of the structure of the political system of the Republic of Kazakhstan.</p>
Prerequisites	School program: History, Man and Society, Literature, Geography
Module forming disciplines	Fundamentals of philosophy Fundamentals of sociology and political science
Module type (mandatory, optional)	Mandatory
Labor intense (credits /academic hours)	6 credits/180 hours
Duration of the module	1-3
Form of teaching	Full-time
Teaching methods	Traditional teaching methods - lectures, practical classes, problem teaching methods, interactive teaching methods
Control Forms	Pass fail exam
Required Resources	Necessary resources Library fund, Internet classes, typical educational, electronic educational resources
Language of instruction	Kazakh, Russian
Post-requisites	Modern history of Kazakhstan, Cultural Studies, Fundamentals of Economics

Specification of Basic Module 5

"Application of basic knowledge of the economy and knowledge of labor laws and regulations to protect their rights in their professional activities"

Scope of competence	-
Name and code of the module	Application of basic knowledge of economics and knowledge of labor laws and regulations to protect their rights in their professional activities
Purpose of the module	After studying the module, the student will be able to understand the basic laws and mechanisms of the functioning of the modern economic system.
Level of professional qualification	5
Learning Outcomes by Module	<ol style="list-style-type: none"> 1. To determine the forms and types of ownership, types of plans, the main economic indicators of the enterprise 2. To understand the development trends of the world economy, the main objectives of the state's transition to a green economy 3. To protect rights in accordance with labor laws 4. To know basic concepts of law and state-legal phenomena
Summary of Content (sections, themes)	<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. Measurement 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. Application of basic methods for calculating gross domestic product and gross national product 7. Definition of global economic problems, ways to overcome them 8. Understanding the legal status in the formation of the identity of a citizen in

	<p>accordance with the provisions of the Constitution of the Republic of Kazakhstan</p> <p>9. Application of evidence-based 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	School program: Man and Society, Basics of Law, Geography
Module forming disciplines	Fundamentals of Economics Fundamentals of law
Module type (mandatory, optional)	Mandatory
Labor intense (credits /academic hours)	4 credit/120 hours
Duration of the module	1-2
Form of teaching	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

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

Scope of competence	-
Name and code of the module	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 the 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, themes)	<ol style="list-style-type: none"> 1. Understanding the rules for design documentation. 2. Design drawings according to the rules of a single system of design documentation. 3. Definition of the purpose and scale of the drawing technical details. 4. Compliance with the requirements of the unified system of design documentation (ESKD). 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.
Module forming disciplines	- Engineering graphics; - Computer design.
Module type (mandatory, optional)	Mandatory / Optional
Labor intense (credits /academic hours)	4 credits / 120 hours
Duration of the module	1 semester
Form of teaching	Full time
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.

Specification of Professional Module 1
“Works Performance on selection of renewable sources of energy”

Scope of competence	Developing a procedure for testing the performance and measuring the characteristics of renewable energy sources
Name and code of the module	Performing work on the selection of renewable energy sources
Purpose of the module	After studying this module, the student will be able to develop procedures for testing the performance and measuring the characteristics of renewable energy sources.
Level of professional qualification	5
Learning Outcomes by Module	<ol style="list-style-type: none"> 1. To demonstrate knowledge of the basic laws and characteristics of electrical circuits. 2. To apply the laws of mechanical movement in the operation of renewable energy equipment 3. To apply in professional activities knowledge of the design, the principle of operation of electrical machines and transformers 4. To modernize electrical equipment parts
Summary of Content (sections, themes)	<ol style="list-style-type: none"> 1. Characteristics of the electric and magnetic fields 2. Determination of the basic laws and properties of electric, magnetic circuits in solving professional problems 3. The differences in the characteristics of DC and AC circuits, linear and non-linear circuits. 4. Determination of the reaction of a flat and spatial system of forces, work, power and efficiency of RES 5. Performing strength calculations for various types of deformation. 6. Performing strength analysis of machine parts 7. Characteristic purpose, classification,

	<p>scope, design and principle of operation of DC electric machines.</p> <p>8. Explanation of devices, modes of operation and the principle of operation of synchronous and asynchronous machines.</p> <p>9. Characteristics of the purpose, classification, scope, design and principle of operation of transformers</p> <p>10. Using the rules of design and reading general drawings and assembly drawings in the work</p> <p>11. Basic technical measurements</p> <p>12. Characteristics of electrical materials used in renewable energy</p> <p>13. Using the package of application programs for the development of design documentation</p>
Prerequisites	School course in physics, mathematics, computer science and computer engineering
Module forming disciplines	Theoretical foundations of electrical engineering, Fundamentals of technical mechanics, Electrical machines and transformers, Electric meekness Electrotechnical materials Computer Technology Basics Engineering Graphics
Module type (mandatory, optional)	Mandatory
Labor intense (credits /academic hours)	16 credits/ 480 hours
Duration of the module	1-6
Form of teaching	Full-time
Teaching methods	Traditional teaching methods are lectures, practical and laboratory classes, problem teaching methods, interactive teaching methods.
Forms of Control	Pass fail exam, exam
Required Resources	Library fund, Internet classes, standard training, laboratory equipment,

	workshops, practice bases, electronic educational resources
Language of instruction	Russian and Kazakh language
Post-requisites	<p>Unconventional and renewable energy sources.</p> <p>Low-waste and resource-saving technologies in the energy sector.</p> <p>Energy and environment.</p> <p>Hydropower and integrated use of water resources</p>

Specification of Professional Module 2
“Work on the technical inspection, operation and modernization of renewable energy sources”

Scope of competence	Conducting organizational studies on the introduction of renewable energy sources
Name and code of the module	PM 2. Work on the technical inspection, operation and modernization of renewable energy sources
Purpose of the module	After studying this module, the student will be able to conduct technical inspection, operation and modernization of renewable energy sources.
Level of professional qualification	5
Learning Outcomes by Module	<ol style="list-style-type: none"> 1. To carry out maintenance of electrical equipment and lighting network of RES 2. To make a choice of electrical equipment of substations and distribution networks of renewable energy sources. 3. To make a choice of electrical equipment of power lines RES 4. To carry out the organization of operation of electrical equipment of renewable energy sources. 5. To carry out control of safe operation of electrical equipment of RES
Summary of Content (sections, themes)	<ol style="list-style-type: none"> 1. Understanding and reading simple electronic circuits 2. Selection of types and operation of electronic devices and electrical equipment, depending on the characteristics of their application 3. Calculation of electric lighting with the use of renewable energy 4. Information on basic information about energy systems of RES 5. Characteristics of the choice of the substation scheme, design features of electrical equipment of power plants and substations of renewable energy sources. 6. Calculation of electrical networks, the choice of devices and current-carrying

	<p>parts for RES</p> <p>7. Knowledge in the field of application of various types of power lines of RES</p> <p>8. Characteristics of supports, wires and structural elements of overhead power lines and equipment of cable power lines of renewable energy sources</p> <p>9. Execution of the calculation of overhead power lines of renewable energy</p> <p>10. Selection of technological equipment during the operation of electrical and electromechanical equipment of renewable energy sources</p> <p>11. Registration of technical documentation for the operation of electrical and electro-mechanical equipment of renewable energy sources.</p> <p>12. Implementation of switching in electrical installations according to the principle schemes of renewable energy sources</p> <p>13. Organization of safe work on the operation and acceptance of mounted electrical equipment RES</p>
Prerequisites	<p>Engineering graphics</p> <p>Educational practice</p> <p>Occupational Safety and Health</p>
Module forming disciplines	<p>Operation, repair and adjustment of electrical equipment of electrical networks, electrical equipment of power lines and substations</p>
Module type (mandatory, optional)	Mandatory
Labor intense (credits /academic hours)	20 credits/ 600 hours
Duration of the module	1-6
Form of teaching	Full-time
Teaching methods	<p>Traditional teaching methods are lectures, practical and laboratory classes, problem teaching methods, interactive teaching methods.</p>

Forms of Control	Pass fail exam, exam
Required Resources	Library fund, Internet classes, standard training, laboratory equipment, workshops, practice bases, electronic educational resources
Language of instruction	Russian and Kazakh language
Post-requisites	Management of electricity supply networks and communication of renewable energy sources Organization of electricity metering system of renewable energy sources Power supply of renewable energy objects

Specification of Professional Module 3
“Organization of work on the study of the introduction of renewable energy sources”

Scope of competence	The introduction of renewable energy sources
Name and code of the module	PM 3. Organization of work on the study of the introduction of renewable energy sources
Purpose of the module	After studying this module, the student will be able to organize work on the study of the introduction of renewable energy sources.
Level of professional qualification	5
Learning Outcomes by Module	<ol style="list-style-type: none"> 1. To use wind power to produce electricity 2. To use solar energy to produce electricity 3. To use hydroelectric power for the production of electricity 4. To use geothermal energy to produce electricity 5. To use secondary energy resources
Summary of Content (sections, themes)	<ol style="list-style-type: none"> 1. Difference in the characteristics of wind energy resources in the regions of Kazakhstan. 2. Characteristics of the types of wind power plants. 3. Explanation of the design wind turbines and wind farms, the dependence of wind power on wind speed and the diameter of the wind wheel. 4. Calculation of the ideal and real wind turbine 5. Understanding the physical basis of solar energy conversion processes. 6. Explanation of the device, operating modes and principle of operation of machineless solar energy converters and photoelectric converters 7. Formulation of types of reservoirs, principles of their operation and

	<p>calculation methods</p> <p>8. Types of hydrogenerators and their features, principles of their operation and calculation methods</p> <p>9. Definition of communication and interaction with the power system</p> <p>10. Determination of the impact of hydropower construction on the environment</p> <p>11. Determination of the thermal regime of the earth's crust</p> <p>12. Characteristics of the source of geothermal heat, environmental performance of geothermal thermal power plants</p> <p>13. Determination of methods and methods of using geothermal heat for electricity generation and in heat supply systems</p> <p>14. Concept of secondary energy resources</p> <p>15. Formulation of the use and conversion of RES in industry and housing and communal services</p> <p>16. Explanation of devices, operating modes and principle of operation of heat pumps</p>
Prerequisites	<p>Engineering graphics</p> <p>Educational practice</p> <p>Occupational Safety and Health</p>
Module forming disciplines	<p>Nontraditional and renewable energy sources Low-waste and resource-saving technologies in the energy sector</p> <p>Energy and Environment</p> <p>Hydropower and integrated use of water resources</p>
Module type (mandatory, optional)	Mandatory
Labor intense (credits /academic hours)	9 credits/270 hours
Duration of the module	1-6
Form of teaching	Full-time

Teaching methods	Traditional teaching methods are lectures, practical and laboratory classes, problem teaching methods, interactive teaching methods.
Forms of Control	Pass fail exam, exam
Required Resources	Library fund, Internet classes, standard training, laboratory equipment, workshops, practice bases, electronic educational resources
Language of instruction	Russian and Kazakh language
Post-requisites	<p>Educational - familiarization practice</p> <p>Industrial training</p> <p>Occupational Safety and Health</p> <p>Operation, repair and adjustment of electrical equipment of electrical networks</p> <p>Electrical equipment of power lines and substations.</p> <p>Basics of industrial electronics</p> <p>Relay Protection</p>

Specification of Professional Module 4
“Power supply, management and control of operation of electrical networks and electrical equipment of renewable energy sources”

Scope of competence	Power supply, management and control of operation of electrical networks and electrical equipment of renewable energy sources
Name and code of the module	PM 4. Power supply, management and control of operation of electrical networks and electrical equipment of renewable energy sources
Purpose of the module	After studying this module, the student will be able to perform power supply, management and control of the operation of electrical networks and electrical equipment of renewable energy sources.
Level of professional qualification	5
Learning Outcomes by Module	<ol style="list-style-type: none"> 1. To manage the power supply networks of renewable energy sources. 2. To know the organization and system for electricity metering of renewable energy. 3. To calculate and select electrical equipment for renewable energy sources.
Summary of Content (sections, themes)	<ol style="list-style-type: none"> 1. Characteristics of the structure of automatic and dispatching control facilities and electrical equipment of electrical networks of electricity supply RES 2. The use of technical means of dispatching control at renewable energy facilities. 3. Characteristics of technical means of electricity metering at renewable energy facilities and technical specifications counters 4. Use of automatic metering systems, control and management of electricity consumption (AMR) 5. Accounting and control of electricity consumption at renewable energy facilities 6. Using methods for determining electrical loads of consumers of electrical energy RES 7. Classification of receivers of electricity according to the required degree of uninterrupted power supply and operating mode 8. Calculation of electrical equipment of electrical networks and wiring products.

	9. Determination of currents and voltages in various types of asymmetrical short circuits. 10. Execution of electrical networks
Prerequisites	Nontraditional and renewable energy sources Low-waste and resource-saving technologies in the energy sector
Module forming disciplines	Power supply network management and renewable communication Organization of electricity metering system for RES Power supply of renewable energy facilities
Module type (mandatory, optional)	Mandatory
Labor intense (credits /academic hours)	12 credits/ 360 hours
Duration of the module	1-6
Form of teaching	Full-time
Teaching methods	Traditional teaching methods are lectures, practical and laboratory classes, problem teaching methods, interactive teaching methods.
Forms of Control	Pass fail exam, exam
Required Resources	Library fund, Internet classes, standard training, laboratory equipment, workshops, practice bases, electronic educational resources
Language of instruction	Russian and Kazakh language
Post-requisites	Renewable energy sources Solar energy and other alternative energy sources. Renewable Energy Calculations

Specification of Professional Module 5
“Diagnostics, research and evaluation of renewable energy sources”

Scope of competence	Diagnostics, research and evaluation of renewable energy sources
Name and code of the module	Diagnostics, research and assessment of renewable energy sources
Purpose of the module	After studying this module, the student will be able to perform diagnostics, research and evaluation of renewable energy sources.
Level of professional qualification	5
Learning Outcomes by Module	<ol style="list-style-type: none"> 1. To diagnose renewable energy sources 2. To organize conservation and development of renewable energy sources
Summary of Content (sections, themes)	<ol style="list-style-type: none"> 1. Calculation of the thermodynamic characteristics of the solar collector 2. Determination of the working parameters of the solar cell; 3. Calculation of the energy parameters of the turbine and wind turbines, the main parameters of the gas generator and the digester, thermodynamic characteristics of thermosyphon and the main parameters of the accumulating systems 4. Calculation of devices that ensure the use of renewable energy sources 5. Determining the occurrence and the essence of the problem of energy conservation technology 6. Formulation of the main factors energy conservation efficiency 7. Programs for the development of alternative energy in Kazakhstan
Prerequisites	<p>Power supply network management and renewable communication</p> <p>Organization of electricity metering system for RES</p> <p>Power supply of renewable energy facilities</p>

Module forming disciplines	Renewable Energy Solar energy and other alternative energy sources. Renewable Energy Calculations
Module type (mandatory, optional)	Mandatory
Labor intense (credits /academic hours)	12 credits/360 hours
The duration of the module	1-6
Form of teaching	Full-time
Teaching methods	Traditional teaching methods are lectures, practical and laboratory classes, problem teaching methods, interactive teaching methods.
Control Forms	Pass fail exam, exam
Required Resources	Library fund, Internet classes, standard training, laboratory equipment, workshops, practice bases, electronic educational resources
Language of instruction	Russian and Kazakh language
Post-requisites	Automation of energy systems Alternative energy sources in building design Professional practice

Specification of Professional Module 6
“Analysis and management of work modes of renewable energy sources”

Scope of competence	Analysis and management of the mode of operation of renewable energy sources and the implementation of the main type of work applied bachelor
Name and code of the module	Analysis and management of the mode of operation of renewable energy sources
Purpose of the module	After studying this module, the student will perform analysis and management of the mode of operation of renewable energy sources.
Level of professional qualification	5
Learning Outcomes by Module	<ol style="list-style-type: none"> 1. To analyze the mode of operation of renewable energy sources. 2. To control the mode of operation of renewable energy sources. 3. To duplicate the work of the master of the site or energy sector of the energy service of the enterprise on renewable energy sources. 4. To carry out the collection of source material for the graduation design of renewable energy facilities. 5. To perform calculations of the main technical and economic indicators of renewable energy facilities.
Summary of Content (sections, themes)	<ol style="list-style-type: none"> 1. Analysis of the development trend of renewable energy sources 2. Development of an efficient energy supply system based on renewable energy sources. 3. Automation of energy systems of renewable energy 4. Development of a methodology for the integrated assessment of the economic efficiency of power generation projects using renewable energy sources. 5. Implementation of the algorithm for assessing the economic efficiency of projects for the development of renewable energy sources

	<p>6. Carrying out using this algorithm calculations for the conditions of Kazakhstan</p> <p>7. Characteristics of the process on technical operation, maintenance and repair of electrical and electromechanical equipment for renewable energy sources</p> <p>8. Application of individual management skills production unit</p> <p>9. Implementation of the organization of the production unit for technical operation, maintenance and repair of electrical and electromechanical equipment of renewable energy facilities</p> <p>10. Conducting the collection of source material for the degree design in accordance with the regulatory and technical documentation of renewable energy facilities and in accordance with the thesis design task</p> <p>11. Application of skills to work with regulatory and technical documentation, reference books</p> <p>12. Preparation of costing for the production and sale of energy generated by renewable energy facilities</p> <p>13. Preparation of estimates, using the regulatory reference literature</p> <p>14. Calculation of the main technical and economic indicators of renewable energy facilities</p>
Prerequisites	<p>Renewable Energy</p> <p>Solar energy and other alternative energy sources.</p> <p>Renewable Energy Calculations</p>
Module forming disciplines	<p>Automation of energy systems.</p> <p>Alternative energy sources in building design</p> <p>Professional practice.</p>
Module type (mandatory, optional)	Mandatory
Labor intense (credits RK/academic hours)	15 credits/ 450 hours

Duration of the module	1-6
Form of teaching	Full-time
Teaching methods	Traditional teaching methods are lectures, practical and laboratory classes, problem teaching methods, interactive teaching methods.
Control Forms	Pass fail exam, exam
Required Resources	Library fund, Internet classes, standard training, laboratory equipment, workshops, practice bases, electronic educational resources
Language of instruction	Russian and Kazakh language
Post-requisites	Pre-diploma practice

PLAN OF EDUCATIONAL PROCESS

Code and the education profile	0900000-energy
Specialty	0918000- Renewable energy
Qualification	09180XX - Applied Bachelor of renewable energy sources

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

Index	Modules and types of training activities	Credits	Form control		The amount of training time (hours)							util on con
			Exam	Differential testing	Total hours	From them:						
						On the types of training			On the forms of organization training			
						Theoretical training	Laboratory and practical works, course projects and works	Practical training *	Auditorium, contact	SRO		
						SROP	SROS					
BM	Basic modules	30	3	8	900	630	270		720	180	60	1-6

BM 1	Application of professional vocabulary, the preparation of business papers in the field of professional activity	6	+	+	180	120	60	-	120	60	15	1-6
BM 2	Understanding the history, role and place of Kazakhstan in the world community	4	+	+	120	120	-	-	120	-		1-6
BM 3	Development and improvement of physical qualities	6	+	+	180	-	180	-	180	-		1-6
BM 4	Application of the basics of philosophical knowledge, social sciences for socialization and adaptation in society and the workforce	6		+	180	180	-	-	120	60	15	1-6
BM 5	Application of basic knowledge of economics and knowledge of labor laws and regulations to protect their rights in their professional activities	4		+	120	120	-	-	90	30	15	1-6
BM 6	Performance, design, reading of design and technological documentation using application programs	4		+	120	90	30	-	90	30	15	1-6
PM	Professional modules on working qualifications	36	+	+	1080	600	240	240	600	480	120	1-6
PM 1	Performing work on the selection of renewable energy sources	16	+	+	480	240	120	120	240	240	60	5

PM 2	Work on the technical inspection, operation and modernization of renewable energy sources	20	+	+	600	360	120	120	360	240	60	5-6
PM	Professional modules of mid-level specialist qualifications	21	+	+	630	300	240	90	300	330	180	1-6
PM 3	Organization of work on the study of the introduction of renewable energy sources	9	+	+	270	120	120	30	120	150	90	5-6
PM 4	Power supply, management and control of operation of electrical networks and electrical equipment of renewable energy sources	12	+	+	360	180	120	60	180	180	90	5-6
	Professional modules of applied bachelor qualifications	27	+	+	810	240	390	180	240	570	390	
PM 5	Diagnostics, research and assessment of renewable energy sources	13	+	+	390	120	180	90	120	270	180	5-6
PM 6	Analysis and management of the mode of operation of renewable energy sources	14	+	+	420	120	210	90	120	300	210	5-6
	Subtotal:	114			3420	1770	1140	510	1860	1560	750	
PP	Professional practice (academic, industrial, undergraduate)	42			1260			1260	180	1080	300	1-6
DD	Diploma project *	9			270		270		60	210	30	6
IC	Intermediate certification	10			300	300			300			1-6

FC	Final certification	2		60	60			60			6
	Total compulsory education:	180		5400	2130	1410	1770	2460	2850	1080	
		(144 +36)		(4320 +1080)							
C	Consultation	10		300	300				300		1-6
O	Optional classes	11		330	330				330		1-6
	Total:	201		6030							
		(165 +36)		(4950 +1080)	2760	1410	1770	2460	3480	1080	

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