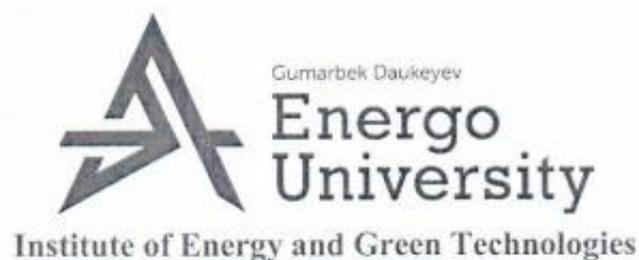


MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF  
KAZAKHSTAN  
NON-PROFIT JOINT STOCK COMPANY

«ALMATY UNIVERSITY OF POWER ENGINEERING AND  
TELECOMMUNICATIONS NAMED AFTER GUMARBEEK DAUKEYEV»



«Agreed»  
General Director of the KazSRI named  
after Sh.Ch. Chokin  
K. A. Bakenov  
14.05. 2025.



«Approved»  
Rector of the KazSRI named after  
Gumarbek Daukeyev  
A. A. Mometov  
22.05. 2025.



**MODULAR EDUCATIONAL PROGRAM  
8D07101 ELECTRIC POWER ENGINEERING  
(DOCTORATE SCIENTIFIC AND PEDAGOGICAL)  
POSTGRADUATE EDUCATION**

**Direction of training (according to the classifier from 13.10.2018):**

8D071 Engineering

**Group of educational programs: D099 Energy and Electrical Engineering**

**The term of study is 3 years**

**Academic degree: *Doctor of Philosophy PhD***

**Qualification level in accordance with the National Qualifications Framework: level 8.**

Almaty 2025

The educational program 8D07101 was developed on the basis of the State Compulsory Standard of Higher Education (order of the Minister of Education and Science of the Republic of Kazakhstan No. 604 dated October 31, 2018, Appendix 8), the National Qualifications Framework (Approved by the protocol of March 16, 2016 by the Republican Tripartite Commission on Social Partnership and regulation of social and labor relations), the Sectoral Qualifications Framework «Energy», taking into account the draft professional standards in the field of electric power.

The modular educational program has been developed at the departments «Power supply, electric drive and electrical engineering», «Electricity supply and renewable energy sources» and «Electric Power Industry».

Head of the educational program Toygozhinova Zh.Zh.

The following took part in the development of the educational program: Mustafin M.A., Doctor of Technical Sciences, Professor of the ESEDEE Department, Bashkirov M.V., Associate Professor of the EPI Department, Umbetkulov E.K., Professor of the EPE Department, Shynybai Zh.S., PhD, Associate Professor of the ESEDEE Department, Amitov E.T., PhD, Associate Professor of the EPE Department.

The program was reviewed and approved at a meeting of the PSEDEE department protocol No.8 dated 07.04.2025.

Head of the Department of PSEDEE  Zh.S. Shynybay

The program was reviewed and approved at a meeting of the EPE department protocol No.8 dated 10.04.2025.

Head of the Department of EPE  Uteshkalyeva L.S.

The program was reviewed and approved at a meeting of the PSRES department protocol No.7 dated 08.04.2025.

Head of the Department of PSRES  Tergemes K.T.

The program of the entrance examination in the specialty was approved by the Educational and Methodological Commission of the Institute of energy and green technologies No.7 dated 08.05.2025.

Director of IEGT  Amitov E.T.

The educational program was reviewed and approved at a meeting of the AUPET Academic Council (Protocol №. 11 of 23.05. 2025).

### **List of designations and abbreviations**

HE	- Higher education
TSMSE	- The state mandatory standard of education
EQF	- European qualification framework
NCO	- National classification of occupations
RK	- Republic of Kazakhstan
NQF	- National Qualifications framework
NQS	- National qualifications system
GEM	- General educational module
EP	- Educational program
GES	- General education subjects
RC	- Required component
UC	- University component
BD	- Basic disciplines
PD	- Profile disciplines
IET	- Individual educational trajectory
IQF	- Industry qualifications framework
PS	- Professional standard
PE	- Postgraduate education
C	- Competencies
TRT	- The result of the training
RWDS	- Research work of doctoral students
CES	- Catalog of elective subjects

### Passport of the educational program

№	Field name Comment	Note
1	Registration number	8D07100049
2	Education area code and classification	8D07 Engineering, Manufacturing and Construction Industries
3	Code and classification of areas of training	8D07 Engineering and Engineering
4	Group of educational programs	D099 Energy and Electrical Engineering
5	Name of the educational program	8D07101 Electricity
6	Type of educational program	Current educational program
7	The purpose of the educational program	Training, taking into account the country's development prospects, of competitive highly qualified and teaching staff for higher educational institutions, scientific and design organizations and the electric power industry as a whole, possessing theoretical and practical knowledge, skills and abilities in research work, owning innovative technologies for organizing and scientific management of energy production that meet the modern requirements of the domestic and world markets for intellectual labor with high spiritual and moral qualities, capable of independent thinking and ensuring progressive scientific, technical, socio-economic and cultural development of society.
8	ISCED level	8
9	NQF level	8
10	ORK level	8
11	Distinctive features of the educational program	No
	Partner university (DDOP)	No
12	List of competencies	The learning outcomes and the correlation of learning outcomes in the educational program with the competencies being formed are presented in Appendices 1 and 3
13	Learning outcomes	ON-1. To reveal the content of the research work. To substantiate, analyze and formulate options for decisions. Apply methods of scientific research and system analysis in the development of automation and control systems; ON-2. To analyze methods of modeling transformers, electric motors, electric drives and automatic control systems using modern computer applications, mathematical description of objects and its use in the modeling process, statistical methods of processing modeling results and the modeling process from the description of the object to the creation of a mathematical model and experiment;

№	Field name Comment	Note
		<p>ON-3. To show in-depth professional knowledge in the field of mathematical modeling of elements of wind turbines. To demonstrate ideas about the possibilities of mathematical modeling, classification of mathematical models and the scope of their applicability. They will receive answers to what fundamental qualitative questions the mathematical model can answer. To develop practical skills of decomposition, abstraction when solving problems in wind energy;</p> <p>ON-4. To master the methodology of bringing the data of short-term expedition measurements to the data of the reference station. Gain experience in organizing and conducting wind observations at the site of the proposed installation of a wind turbine. Master the method of calculating hydropower resources and the measuring system for monitoring water flow;</p> <p>ON-5. To master the prerequisites for energy efficiency on a global scale and the prerequisites for energy efficiency and energy conservation, the methodology for examining electrical networks, technical solutions for energy efficiency, problems of electrical energy quality in distribution networks and consumers of electricity, basic requirements for reliability of power supply and methods of its improvement, issues of regulation of power consumption modes, the legislative framework of Kazakhstan;</p> <p>ON-6. To study the main types of power electronics elements and the principles of building converter devices, such as AC-DC converters, DC-AC converters, frequency converters, etc.;</p> <p>ON-7. To master the principles of construction and operation of compensated and controlled (flexible) SVN power transmission lines and their influence on the distribution of voltage and reactive power, and the equations of the long line, and its wave characteristics;</p> <p>ON-8. To master the theory of transmission of electrical energy at ultrahigh voltage (UHV) over long distances. Types and classification of modern SVN power transmission lines. Parameters and design features of supports, wires and surge protection. The concept of bandwidth. Criteria for assessing the capacity and the impact on it of the design of modern SVN lines. Basic design parameters and fundamentals of mechanical calculation;</p>

№	Field name Comment	Note
		<p>ON-9. To study the properties and characteristics of static compensating devices, methods of their calculation and selection of parameters. Static thyristor compensators. Circuits and operating principle of asynchronous compensators. Uncontrolled longitudinal compensation devices. Controlled longitudinal compensation devices. Comprehensive regulation of the active and reactive power of a power transmission line using a "combined regulator";</p> <p>ON-10. Demonstrate in-depth knowledge of modern industrial production, characterized by an increase in the scale and complexity of technological processes, an increase in the unit capacity of individual units and installations, the use of intensive, high-speed modes, increased requirements for product quality, personnel safety, equipment safety and the environment. Economical, reliable and safe operation of complex industrial facilities can be ensured only with the help of perfect principles and technical means;</p> <p>ON-11. To analyze the features of centrifugal loading and options for creating object-oriented electric drive systems that minimize energy losses and methods for calculating parameters, static and dynamic characteristics, and selecting elements of an automated electric drive for various purposes.</p>
14	Full-time form of education	Full-time form of education
15	Language of instruction Russian, Kazakh	Language of instruction Russian, Kazakh
16	Amount of loans 180	Amount of loans 180
17	Awarded academic degree Doctor of Philosophy PhD	Awarded academic degree Doctor of Philosophy PhD
18	Availability of an attachment to the training license	No.KZ80LAA00018161 dated 05.05.2020
19	Availability of EP accreditation Yes	Availability of EP accreditation Yes
	Name of the accreditation body	IAAR "Independent Agency for Accreditation and Rating"
	Validity period of accreditation	05.04.2024.-04.04.2029.
20	Information about disciplines	Information about the disciplines Information about the disciplines VK/KV BD, PD are presented in Appendix 1
21	The field of professional activity	The field of professional activity is the field of science and technology, which includes a set of technologies, tools, methods and methods of human activity aimed at creating efficient generation, distribution and consumption of electric energy.

№	Field name Comment	Note
		Institutions of higher and postgraduate education; scientific research and design organizations; enterprises for the production, transmission, distribution and consumption of electricity.
22	Types of professional activity	Specialist for work in research universities, research and design institutes, universities, enterprises, energy profile capable of performing the following types of professional activities: - organizational and technological; - settlement and design; - service and operational; - production and technological; - organizational and managerial; - scientific research; - pedagogical; - project information.
23	Modular curriculum	It is given in appendix 2.

**Table 2 – Matrix of correlation of learning outcomes in the educational program as a whole with the competencies being formed**

<b>№</b>	<b>Name of the discipline</b>	<b>ON1</b>	<b>ON2</b>	<b>ON3</b>	<b>ON4</b>	<b>ON5</b>	<b>ON6</b>	<b>ON7</b>	<b>ON8</b>	<b>ON9</b>	<b>ON10</b>	<b>ON11</b>
1	Academic writing	V										
2	Scientific research methods	V										
3	Pedagogical practice										V	
4	Research practice					V					V	
5	Building protection of asynchronous motors on integrated converters					V	V					V
6	Relay protection using reed switches and feed currents from electric motors					V	V					
7	Current protection on reed switches						V				V	
8	Protection on magnetic current transformers					V						V
9	Compensated, managed and flexible ultra-high voltage lines.							V				
10	Static compensating devices for AC power lines.								V	V		
11	Design, parameters and capacity of extra high voltage lines.								V	V		
12	Digital monitoring and control systems for the operational reliability of electrical networks and systems.							V	V			
13	Automation of typical technological processes		V									
14	Modern complete energy-saving electric drives										V	V
15	Methods for improving the energy efficiency of electric drives of centrifugal mechanisms.											V
16	Research and forecasting methods of energy efficiency potential in industrial machinery.		V								V	

№	Name of the discipline	ON1	ON2	ON3	ON4	ON5	ON6	ON7	ON8	ON9	ON10	ON11
17	Modern problems and promising technologies of energy saving in Kazakhstan.				V						V	
18	Modern controlled power converters						V				V	V
19	Methods for assessing and predicting the potential of renewable energy sources		V	V	V							
20	Modern wind and solar generation				V				V	V		
21	Research work of a doctoral student, including internship and doctoral dissertation	V										