MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
NON-PROFIT JOINT-STOCK COMPANY
«ALMATY UNIVERSITY OF POWER ENGINEERING AND TELECOMMUNICATIONS NAMED AFTER GUMARBEK DAUKEYEV»
Institute of Energy and Green Technologies

Gumarbek Daukeyev
Energo University

«Agreed»
Director General of the Kazakh Research Institute of Energy named after Academician S.C.Chokin
_____ Bakenov K.A.
«22» _____ 2025

«Approved»
Rector of AUES
_____ Nygymetov G.S.
«___» _____ 2025.

MODULAR EDUCATIONAL PROGRAM
"7M07118 MODERN AND INNOVATIVE RENEWABLE ENERGY TECHNOLOGIES"
(Master's Degree in Scientific and Pedagogical Sciences)

POSTGRADUATE EDUCATION

Field of Education (according to the classifier from October 13, 2018):
7M07 Engineering, manufacturing, and construction industries
Field of Study (according to the classifier from October 13, 2018):
7M071 Engineering and Engineering work
Program Group:
M099 Power and Electrical Engineering

Duration of Study: 2 years
Awarded Academic Degree: Master of Technical Science
Qualification Level in accordance with the National Qualifications Framework:
Level 7.

Almaty 2025.

Training trajectories (specializations):

- Modern innovative renewable energy technologies;
- Efficient management of renewable energy facilities;

The educational program "7M07118 Modern and Innovative Technologies of Renewable Energy" (Master's program in scientific and pedagogical science) was developed based on: National Qualifications Framework, approved by the protocol of March 16, 2016 of the Republican Tripartite Commission on Social Partnership and Regulation of Social and Labor Relations; Sectoral Qualifications Framework "Energy", approved by the Protocol of the Sectoral Commission on Social Partnership and Regulation of Social and Labor Relations in the Energy Industry No. 05-13-3-4 / PR dated July 25, 2019;
State Compulsory Standard of Higher Education. Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022, No. 2. Registered with the Ministry of Justice of the Republic of Kazakhstan on July 27, 2022, No. 28916; Professional standards or draft standards.

The educational program "7M 07118 Modern and Innovative Technologies of Renewable Energy" was developed at the Department of Electricity Supply and Renewable Energy Sources.

Head of the educational program _____ Soltanayev A.M.

The following took part in the discussion on the development of the educational program:
General Director of Kazakh Research Institute of Energy named after Academician Sh.Ch. Chokin LLP Bakenov K.A.
Director Future Power Solutions LLP Tsatsin D. A

Educational program "7M 07118 Modern and Innovative Technologies of Renewable Energy" reviewed and approved on meeting educational and methodological commissions Institute electric power and electrical engineering (minutes No. 7 of 08.05.2025).

Director of the IEGT _____ Amitov E. T.

Educational program "7M 07118 Modern and Innovative Technologies of Renewable Energy" reviewed and approved on Scientist Council of the AUPET named after Gumarbek Daukeeva (protocol No. 11 of 05/23/2025) .

List of designations and abbreviations

HE	Higher education
SCES	State Compulsory Education Standard
EQR	European Qualifications Framework
NCO	National Classifier of Occupations
RK	Republic of Kazakhstan
NQF	National Qualifications Framework
NQS	National Qualifications System
GEM	General educational module
EP	Educational program
GED	General education disciplines
RC	Required component
UC	University component
BD	Basic disciplines
MD	Major disciplines
IET	Individual educational trajectory
SQF	Sectoral Qualifications Framework
PS	Professional standard
PE	Postgraduate education
LN	Learning outcome
CW	Coursework
CGW	Calculation and graphic work
CEC	Catalog of elective courses

1. Educational program passport

No.	Field name	Note
1	Registration number	7M07100386
2	Code and classification of the field of education	7M07 Engineering, manufacturing and construction industries
3	Code and classification of training areas	7M071 Engineering and Engineering Science
4	Group of educational programs	M 099 Power Engineering and Electrical Engineering
5	Name of the educational program	7M07118 Modern and innovative renewable energy technologies (Master's degree in scientific and pedagogical science)
6	Type of OP	a) New OP;
7	The purpose of the OP	The goal of the master's degree program is to develop competencies for fundamental and applied scientific research and for solving practical problems in the field of renewable energy. It trains a new generation of specialist with broad fundamental knowledge, creativity, initiative, and adaptability to the changing demands of the labor market and clean energy technologies.
8	ISCED level	7
9	Level according to the National Qualification Test	7
10	Level according to the ORK	7
11	Distinctive features of the OP	b) New
	Partner university (SOP)	No
	Partner university (DDOP)	No
12	List of competencies	The learning outcomes for the 7M07118 educational program—"Modern and Innovative Renewable Energy Technologies"—are expressed through competencies in accordance with the National and Sectoral Qualification Frameworks, professional standards, and aligned with the Dublin Descriptors and the European Qualification Framework. Graduates should possess the following competencies: 1) demonstrate developmental knowledge and understanding acquired at the higher education level that provides the basis or opportunity for original development or application of ideas; 2) apply knowledge, understanding, and problem-solving abilities to new or unfamiliar situations in the contexts and frameworks of broader (or interdisciplinary) areas related to the area of study; 3) integrate knowledge, cope with complexity, and make judgments based on incomplete or limited information, taking into account ethical and social responsibility for the application of

		these judgments and knowledge; 4) clearly and concisely communicate your findings and knowledge and their rationale to specialists and non-specialists; 5) continue learning independently. Requirements for key competencies of graduates of scientific and pedagogical master's programs: Key competencies **of KKN1** (*research*) - must: - *have an idea* of the role of science and education in public life, modern trends in the development of scientific knowledge, current methodological and philosophical problems of natural (social, humanitarian, economic) sciences; - know: the methodology of scientific knowledge, the principles and structure of organizing scientific activity; - *be able to* : use the acquired knowledge to conduct scientific research, analyze existing concepts, theories and approaches to the analysis of processes and phenomena, integrate knowledge obtained within different disciplines to solve research problems in new unfamiliar conditions, think creatively and creatively approach the solution of new problems and situations, be fluent in a foreign language at a professional level, summarize the results of scientific research and analytical work in the form of a dissertation, scientific article, report, etc.; - *have skills in* : scientific research, solving standard scientific problems, using modern information technologies in the educational process, professional and intercultural communication, public speaking, correctly and logically formulating one's thoughts in oral and written form, expanding and deepening the knowledge necessary for everyday professional activities and continuing education in doctoral studies; - *be competent* : in the field of scientific research methodology, in ways of ensuring continuous updating of knowledge, expansion of professional skills and abilities. Key competencies **of KKN2** (*pedagogical*): - *have an idea of* : the professional competence of a higher education teacher, the contradictions and socio-economic consequences of globalization processes; - *know* : the psychology of students' cognitive activity in the learning process, psychological methods and means of improving the effectiveness and quality of learning; - *be able to* : apply knowledge of pedagogy and psychology of higher education in their teaching activities, apply interactive teaching methods, conduct information-analytical and information-bibliographic work with the involvement of modern information technologies, allowing for scientific research and the teaching of specialized disciplines in universities; - *have skills* : to carry out educational and pedagogical activities using credit technology of education, methods of teaching professional disciplines; - *be competent* : in the field of scientific and scientific-pedagogical activity in higher educational institutions, in matters of modern educational technologies, in the implementation of scientific

		projects and research in the professional field. Requirements for special competencies of a graduate of a scientific and pedagogical master's program: Special competencies **SKN1** (*calculation and design and production and technological*) – the graduate must: - *have an understanding of* : the development and implementation of progressive technologies for the design and operation of electrical equipment at renewable energy facilities, as well as measures to increase the service life of electrical equipment at renewable energy stations, prevent accidents and industrial injuries, reduce the labor intensity and cost of repairs, and improve their quality. - *know* : carrying out work to modernize and improve the reliability of renewable energy facilities and systems and their equipment ; - *be able to* : synthesize professional knowledge with practice, create new applied knowledge in the field of electric power engineering and/or at the intersection with other specialties; identify sources and search for information necessary for improving activities. - *have the skills to* : participate in design work, necessary calculations using computer programs, testing and adjustment of electrical equipment; in drawing up reports in accordance with the forms established by current regulatory documents; - *be competent* : in considering rationalization proposals and inventions, issuing an opinion on them, ensuring the implementation of accepted proposals. Special competencies **SKN2** (*organizational and managerial*) – the graduate must: - *have an idea of* : the organization of work to improve the qualifications and professional skills of workers and team leaders, training them in second and related professions, and conducting educational work in the team; - *know* : the formation of teams (their quantitative, professional and qualification composition), the development and implementation of measures for the rational maintenance of teams, the coordination of their activities; - *be able to* : analyze the results of production activities, account for the expenditure of the wage fund, ensure the correctness and timeliness of the preparation of primary documents for accounting of working hours, output and downtime; - *be competent* : in ensuring trouble-free and reliable operation of all types of electrical equipment, their correct operation, timely high-quality repair and maintenance.
13	Learning outcomes	RO-1. Demonstrate the ability to refine and develop their intellectual level based on knowledge of the philosophy of science, higher education pedagogy, foreign languages, project management, and psychology. Able to independently acquire new knowledge and skills and expand their scientific worldview, speak publicly, and work in a group. RO-2. Analyze current issues related to the use of renewable energy and renewable energy facilities. Forecast promising

		trajectories for green energy development. Conduct scientific research using modern methods, process experimental results, solve applied research problems, and prepare scientific articles. Use methods for planning multivariate experiments and mathematical data processing. Conduct a regional analysis of the distribution of renewable energy resources across the territory. RO-3. Demonstrate theoretical and practical knowledge in the field of modern diagnostics and insulation testing of electrical equipment at renewable energy facilities. Be able to analyze power quality parameters and electromagnetic compatibility. RO-4. Apply theoretical and practical knowledge of modern computer and information technologies, digital equipment, and software to solve scientific and technical problems in the electric power industry. Use GIS technologies to assess renewable energy resources and possess skills in modeling electric power system components in the MatLab environment , planning and conducting experiments based on the scientific principles of modern processing methods. RO-5. Proficient in methods for calculating and analyzing the potential of renewable energy resources and the parameters of renewable energy facility components, and the ability to comprehensively utilize renewable energy power plants and various types of energy storage devices. RO-6. Develop energy-saving projects in power systems using renewable energy sources. Adapt new energy-saving technologies to autonomous renewable energy systems. Apply circuit designs for optimal power regulation and power generation at renewable energy facilities. Use preventive testing methods and assess the insulation condition of electrical equipment at renewable energy facilities, consider protection against electromagnetic interference on secondary circuit insulation, and monitor the impact of electrical power quality on electromagnetic compatibility. RO-7. Develop knowledge of promising types of electric transport and autonomous power supply systems based on renewable energy sources. Explore the economic and organizational challenges that arise when integrating renewable energy facilities into the unified energy system. RO-8. Develop mathematical models of objects under study. Develop projects for integrating renewable energy facilities into the power grid. Be able to effectively use conversion equipment for integration. RO-9. Possess project management skills in the electric power industry and the ability to conduct technical and economic analysis of the effectiveness of project solutions. Conduct financial and economic calculations to assess the effectiveness of a renewable energy investment project. RO-10. Develop and competently prepare technological documentation in accordance with all regulatory rules and laws. Assess the effectiveness of renewable energy projects and their subsequent implementation and implementation. May make decisions to ensure socio-economic development and environmental objectives.
14	Form of study	Daytime, distance learning.
15	Language of	Russian, Kazakh

	instruction	
16	Volume of loans	120
17	Awarded academic degree	Master of Engineering sciences
18	Availability of an appendix to the license for the direction of personnel training	№KZ80LAA00018161 from 05.05.2020
19	Availability of accreditation of the educational institution	Yes
	Name of the accreditation body	Independent agency for accreditation and rating (IAAR)
	Validity of accreditation	31.05.2024 -30.05.2029
20	Information about disciplines	Information on the disciplines VK/KV, BD and PD are presented in Appendix 1
21	Sphere of professional activity	A field of science and technology that includes a set of technologies, means, methods and techniques of human activity aimed at research, design, production and operation of renewable energy sources.
22	Types of professional activity	- design and calculation and design and engineering; - organizational and managerial; - production and technological; - service and operational; - installation and commissioning; - scientific and pedagogical
23	Modular curriculum	Provided in **Appendix 2**

2. Matrix of correlation of learning outcomes for the educational program as a whole with the developed competencies

No.	Name of disciplines	ON1	ON2	ON3	ON4	ON5	ON6	ON7	ON8	ON9	ON10
1	Foreign language (professional)	v									
2	History and philosophy of science	v									
3	Pedagogy of Higher Education	v									
4	Psychology of Management	v									
5	Diagnostics and professional testing electrical equipment							v	v		
6	Power quality in the electric power industry							v	v		
7	Modern methods for assessing the insulation condition of electrical equipment							v	v		
8	Electromagnetic compatibility in the electric power industry							v	v		
9	Modeling elements of electric power systems in the MatLab environment			v							v
10	Transition to clean energy		v							v	
11	Modern problems and prospects for the use of renewable energy sources		v		v						
12	Analytical and statistical study of promising renewable energy resources			v							v
13	Integration of renewable energy sources into the power grid and reliability of power supply					v	v				
14	Using power electronics to integrate renewable energy sources into the power grid						v		v		
15	Research and analysis of promising renewable energy resources		v	v							
16	Integrated use of renewable energy facilities			v					v		
17	Organization and management of public procurement	v								v	
18	Fundamentals of modeling and processing data from		v								v

	scientific and engineering experiments										
19	of renewable energy technology projects and development of technological documentation				v					v	
20	Development of technological documentation and evaluation of the effectiveness of renewable energy projects				v					v	
21	Theory and practice of project management	v								v	
22	Theory of modeling and scientific experiment		v								v
23	Electric transport and energy storage technologies			v		v					
24	Energy saving in autonomous renewable energy systems				v			v			
25	Energy saving and use of renewable energy systems					v		v			