MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN

NON-PROFIT JOINT STOCK COMPANY

« ALMATY UNIVERSITYOF ENERGY AND COMMUNICATIONS NAMED AFTER GUMARBEK DAUKEEV»

INSTITUTE OF ELECTRIC POWER ENGINEERING AND ELECTRICAL ENGINEERING

«Agreed»

General Director of the Sh.Ch. Chokin
Kazakh Research Institute of
Electrophysics
K.A. Bakenov
«08» 05 2025 y.

«Approved»

Rector of AUES
Nygymetov G.S.
«____» _____ 2025 y.

MODULAR EDUCATIONAL PROGRAM
7M07116 ELECTRIC POWER SYSTEMS

(MASTER'S PROGRAM IN SCIENCE AND PEDAGOGY)

POSTGRADUATE EDUCATION

Field of Study: 7M071 Engineering and Engineering Activities
Group of educational programs: M099 Electric Power Engineering

Duration of Study 2 years
Degree Awarded: Master of Engineering Science
Qualification Level according to the National Qualifications Framework: Level 7

Almaty 2025 y.

The Modular Educational Program (MEP) 7M07116 – Electric Power Systems is developed based on the State Compulsory Standard of Higher Education (Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018, No. 604, Appendix 8), the National Qualifications Framework (approved by the protocol of the Republican Tripartite Commission on Social Partnership and Regulation of Social and Labor Relations on March 16, 2016), the Sectoral Qualifications Framework "Energy", and draft professional standards.

The MEP was developed at the departments: « Electric Power Engineering »

Head of the educational program: Uteshkalieva L.Sh. – Assoc.Prof.-prepod. of the EE Department, PhD.

The following participated in the discussion of the MEP:

Turlybekov A.K. - Commercial Director of JSC KazNIPIITES "Energy";

Adilbekov N.K. - Deputy Chief Engineer of JSC "AJK".

The MEP was reviewed and approved at a meeting of the EE Department. № 8 dated 10.04. 2025y.

Head of the Department of EE _____ Uteshkalieva L.Sh..

The MEP was approved at a meeting of the educational and methodological commission of the Institute of Energy and Green Technologies. Protocol № 7 dated 08.05. 2025y.

Director of IEZT _____ E.T. Amitov

The MEP was reviewed and approved by the Academic Council of the Almaty University of Energy and Communications named after Gumarbek Daukeev (protocol №___ от _____20 ___y.).

1. Passport of the educational program

№	Field Name	Note
1	Registration Number	
2	Code and Classification of the Field of Education	7M07 Engineering, Processing, and Construction Industries
3	Code and Classification of the Fields of Study	7M071 Engineering and Engineering Practice
4	Group of Educational Programs	M099 Energy and Electrical Engineering
5	Name of the Educational Program	7M07116 Electric Power Systems (Scientific and Pedagogical Master's Program)
6	Type of Educational Program	Active Educational Program
7	Goal of the Educational Program	Training of highly qualified scientific and pedagogical personnel in the generation, transmission, and distribution of electric power, possessing theoretical and practical knowledge, skills, and abilities to conduct research and impart knowledge to students, capable of independent thinking and contributing to the progressive scientific, technological, socio-economic, and cultural development of society.
8	ISCED Level	7
9	NQF Level	7
10	SQF Level	7
11	Distinctive Features of the Educational Program	none
	Partner University (Additional Educational Program)	none
12	List of Competencies	The learning outcomes of the Educational Program 7M07116 – "Electric Power Systems" are expressed through competencies in accordance with the National and Sectoral Qualifications Frameworks, professional standards, and aligned with the Dublin Descriptors and the European Qualifications Framework. Graduates are expected to possess the following competencies: 1)Demonstrate advanced knowledge and understanding acquired at the higher education level, which forms the basis or opportunity for original development or application of ideas, often in the context of research; 2)Apply knowledge, understanding, and problem-solving skills in new or unfamiliar situations within broader (or interdisciplinary) contexts related to the field of study; 3)Integrate knowledge, manage 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)Communicate clearly and effectively their conclusions and knowledge, along with the underlying rationale, to both specialists and non-specialists; 5)Continue learning independently and engage in self-directed professional development.

		Requirements for the key competencies of graduates of the Scientific and Pedagogical Master's Program: Key Competencies **KKN1** (Research Competencies) – the graduate should: - Have an understanding of the role of science and education in society, current trends in the development of scientific knowledge, and the relevant methodological and philosophical issues in the natural (social, humanitarian, economic) sciences; - Know the methodology of scientific inquiry, as well as the principles and structure of organizing research activities; - Be able to: apply acquired knowledge to conduct scientific research; analyze existing concepts, theories, and approaches to the study of processes and phenomena; integrate knowledge from different disciplines to solve research problems in new and unfamiliar conditions; think creatively and approach new problems and situations innovatively; possess professional-level proficiency in a foreign language; summarize the results of research and analytical work in the form of a dissertation, scientific article, report, etc.; - Possess the following skills: conducting research activities; solving standard scientific problems; using modern information technologies in the educational process; professional communication and intercultural interaction; public speaking; correctly and logically presenting ideas in both oral and written form; expanding and deepening knowledge necessary for everyday professional activities and for continuing education at the doctoral level; - Be competent in the methodology of scientific research, as well as in methods for continuously updating knowledge and expanding professional skills and abilities. Key Competencies **KKN2** (Pedagogical Competencies): - Have an understanding of the professional competencies of a higher education instructor, as well as the contradictions and socio-economic consequences of globalization processes; - Know the psychology of students' cognitive activity during the learning process, as well as psychological methods and tools for enhancing the effectiveness and quality of education; - Be able to: apply knowledge of higher education pedagogy and psychology in teaching activities; use interactive teaching methods; carry out information-analytical and information-bibliographic work using modern information technologies, enabling the conduct of scientific research and the teaching of specialized disciplines at universities; - Possess the following skills**:** carrying out educational and pedagogical activities using the credit-based learning system; applying methods for teaching professional disciplines; - Be competent in scientific and scientific-pedagogical activities at higher education institutions, in the use of modern educational technologies, and in conducting scientific projects and research within the professional field. Requirements for the special competencies of graduates of the Scientific and Pedagogical Master's Program: Special Competencies **SCN1** (Design, Calculation, and Production-Technological Competencies) – the graduate should: - Have an understanding of the development and implementation of advanced technologies for the design and operation of electrical equipment, as well as measures to extend the service life of electrical equipment, prevent accidents

		and occupational injuries, reduce labor intensity and maintenance costs, and improve maintenance quality. - Know how to carry out modernization work and improve the reliability of electric power systems and their equipment; - Be able to: integrate professional knowledge with practical experience; 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 to improve professional activities. - Possess the following skills: participating in project work; performing necessary calculations using computer software; testing and commissioning electrical equipment; preparing reports in accordance with the forms established by current regulatory documents; - Be competent in reviewing rationalization proposals and inventions, providing evaluations for them, and ensuring the implementation of accepted proposals. Special Competencies **SCN2** (Organizational and Managerial Competencies) – the graduate should: - Have an understanding of the organization of activities for improving the qualifications and professional skills of workers and foremen, training them in secondary and related professions, and conducting educational and motivational work within the team; - Know how to organize teams (including their quantitative, professional, and qualification composition), develop and implement measures for the efficient management of teams, and coordinate their activities; -: Be able to: analyze the results of production activities; monitor labor cost expenditures; ensure the accuracy and timeliness of primary documentation for tracking working hours, output, and downtime; - Be competent in ensuring the safe and reliable operation of all types of electrical equipment, their proper use, and timely, high-quality maintenance and technical servicing.
13	Learning Outcomes	**LO-1**. Will be able to effectively use modern computer and information technologies, digital equipment, and software to solve scientific and technical problems in electric power engineering. Will possess skills in modeling elements of electric power systems and working with computer programs such as Rastr Win, PS CAD, and MatLab. **LO-2.** Able to improve and develop their intellectual level based on knowledge of the philosophy of science, higher education pedagogy, foreign languages, and management psychology. Capable of independently acquiring new knowledge and skills and expanding their scientific worldview. **LO-3.** Will demonstrate theoretical and practical knowledge in the field of modern diagnostics and testing of power equipment, improving the reliability and quality of electric power, as well as in issues of electromagnetic compatibility in electric power engineering. **LO-4.** Will possess knowledge of integrated digital automatic control systems in electric power systems and electric drives, skills in programming, diagnostics, and adjustment of variable-frequency drives, and the ability to conduct research on modern electric drives using the MATLAB Simulink software environment. **LO-5.** Will be able to demonstrate knowledge of calculating operating modes of power plants and electrical networks, as well as methods for reducing losses. Will be able to perform calculations of transmission line elements and

		have an understanding of overvoltage protection, modern relay protection, and emergency automation systems. **LO-6.** Will demonstrate skills in managing projects related to the implementation of measures and methods for ensuring the stability of electric power systems, the modernization of power plant equipment and electrical networks, their automatic control, and efficient operation. **LO-7.** Able to develop measures for energy and resource conservation and for the implementation of renewable energy sources in both autonomous and grid-connected modes. Capable of adapting new energy-saving technologies and energy storage systems at existing power facilities and enterprises in other sectors of the economy. **LO-8**. Able to demonstrate knowledge of scientific management of energy enterprises, skills in forecasting electricity consumption and power demand, developing and implementing sections of innovation strategy, performing techno-economic analysis of project solutions, and using computer-aided design systems and applied software in scientific and engineering-technical design calculations. **LO-9.** Will be able to independently analyze scientific and technical problems of electric power systems, access and evaluate scientific information in international networks, plan and conduct scientific experiments, and process and present the results of research. **LO-10.** Will be able to conduct teaching and scientific research at an appropriate methodological level, deliver classroom lessons, and prepare and present master's theses and scientific projects. .
14	Form of Study	Full-time
15	Language of Instruction	Russian, Kazakh
16	Credit Load	120
17	Degree Awarded	Master of Technical Sciences
18	Availability of an Appendix to the License for the Field of Study	Perpetual State License for Educational Activities KZ 80LAA00018161 dated 05.05.2020 y.
19	Accreditation Status of the Educational Program	Accredited
	Name of the Accreditation Body	IAAR
	Accreditation Validity Period	05.04.2024-04.04.2029
20	Information on Courses	Information on the Core/Compulsory, Basic, and Elective Courses is provided in Appendix 1.
21	Field of Professional Activity	The field of professional activity – electric power engineering, as a part of the energy sector, encompasses the set of tools, methods, and techniques of human activity for the generation, long-distance transmission, distribution, and consumption of electric energy.
22	Types of Professional Activity	A specialist for work in research universities, scientific research and design institutes, higher education institutions, and enterprises (generating, transmitting, distributing, and consuming electric energy), capable of performing the following types of professional activities:

		-Design and engineering; -Production and technological; -Organizational and managerial; -Scientific and pedagogical.
23	Modular Curriculum	Presented in Appendix 2

2. The matrix of correlation of learning outcomes in the educational program as a whole with the competencies being formed

№	Name of disciplines	ON1	ON2	ON3	ON4	ON5	ON6	ON7	ON8	ON9	ON10
1	History and philosophy of science		v								
2	Foreign language (professional)		v								
3	Higher school pedagogy		v								
4	Psychology of management		v								
5	Teaching practice										v
6	Methods of scientific research and organization of experiments									v	
7	Electromagnetic compatibility in the electric power industry			v							
8	Modeling of elements of electric power systems in the Matlab environment	v			v						
9	Theory of modeling and scientific experiment									v	
10	Diagnostics and professional testing of electrical equipment			v							
11	Modern methods for assessing the insulation condition of electrical equipment			v							
12	Scientific and technical problems of electric power systems									v	
13	Electricity losses in electric networks					v					
14	Research practice										v
15	Emergency response operational and automatic control of electric power systems					v					
16	Electricity quality in the electric power industry			v							
17	Energy storage in electric power systems							v			
18	Mechanical characteristics and calculation of elements of power transmission lines					v					
19	Special modes of long-range power transmission					v					
20	Methods of reliability analysis and assessment in the electric power industry			v							
21	Theory and practice of project management								v		

22	Organization and management of public procurement								v		
23	Alternative sources of electricity							v			
24	Optimization of own needs of electric power plants					v					
25	Operating modes of synchronous generators of electric stations					v					
26	Energy saving in electric drives of electric stations				v						
27	Relay protection of distribution power grids and surge limitation					v					
28	Means and methods of ensuring the stability of electrical systems						v				
29	The main problems of operation of electrical networks and systems	v									
30	Scientific foundations of energy management								v		