

NJSC "Kazakh National Research Technical University named after K. I. Satbayev"

A. Burkitbaev Institute of Industrial Automation and Digitalization

Department of Power Engineering

CURRICULUM PROGRAM

«ELECTRICAL ENGINEERING AND POWER ENGINEERING» MASTER OF ENGINEERING AND TECHNOLOGY

based on the following specialty of the defunct classifier of specialties: 6M071800 - " Electrical Power engineering"

1st edition

in accordance with the State Educational Standard of Higher Education 2018

Almaty 2020

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The program is drawn up and signed by the parties:

From KazNRTU named after K.I.Satpayev:

1 Head of the
Department of Power Engineering,
PhD, associate professor



Ye. Sarsenbayev

2 Director of the Institute of Industrial
Automation and Digitalization,
PhD



B.Omarbekov

3 Chairman of the educational and
methodological group of the Department
of Power Engineering, Candidate of
Technical Sciences, Associate Professor



Ye. Khidolda

From employers - Director
LLP "Lighting Technologies Kazakhstan"



G.E.Abdykalykov

Approved at a meeting of the Educational and Methodological Council of the
Kazakh National Research Technical University named after K.I. Satbayev.
Minutes No. 4 dated 14.01.2020

Qualification:

Level 7 of the National Qualifications

Framework:

7M071 Engineering and Engineering (Master)

Professional competencies: Electric power engineering, electric power
systems and networks, relay protection and automation, power supply,
renewable energy

Brief description of the program

1 Goals the

Purpose of the master's educational program "electrical Engineering and power engineering" is to train personnel for production with relevant professional knowledge and practical skills in the field of electric power, able to solve problems of improving society, economy and production.

2 Types of professional activity

Master of engineering and technology in the educational program "Electrical Engineering and Power Engineering" must have the following competencies in accordance with the types of professional activity:

- search, analyze and process information to solve production tasks;
- use modern information technologies to solve applied problems;
- know the methods of calculation and selection of power energy converters and conversion equipment;
- use modern systems and methods of Electromechanical energy conversion;
- know the methods of calculation and selection of renewable energy sources;
- develop plans for the organization of innovative activities in the enterprise;
- evaluate innovative and technological risks when implementing new technologies;
- demonstrate the ability to select and use methods and methods for optimizing power grids;
- possess the ability to install, test, set up and put into operation electric power and electrical equipment;
- organize and carry out operation, repair and maintenance of industrial electrical installations;
- know how to protect against overvoltage, insulation testing methods and operating principles of test installations;
- know the types of high-voltage electrical technologies used.

The educational program "Electrical Engineering and Power Engineering" provides training for masters in the following types of activities:

Design and engineering activities

- ability to create and develop various simulation models and electrical circuits;
- knowledge to carry out technological and electric power calculations, choose electrical and Electromechanical equipment;

Design and technological activities

- ability to justify effective operating parameters and indicators of the electric power system;

- knowledge to develop energy-efficient, resource-saving technologies and measures to protect the environment;

- skills to create a business plan for a technology project;

Organizational and management activities

- ability to organize team activities, make work plans and set tasks;

- ability to carry out activities for the organization of production, develop and compile the necessary documentation;

- ability to solve issues of material and technical support and control the execution of tasks.

3 Objects of professional activity

Graduates of this specialty can make a career:

- in the design field of activity;

- in national and multinational energy companies and industrial enterprises.

During the training, practical training is provided at such enterprises as: NC ‘KEGOC’, JSC ‘AZHK’, JSC ‘AIEN’, JSC "Kazatomprom", "Karachaganakpetroleumoperating" and others.

There are also specialized internships at Tomsk Polytechnic University (Russia) and Peter the Great Saint Petersburg Polytechnic University (Russia).

PASSPORT OF THE EDUCATIONAL PROGRAM

1 Scope and content of the program

The duration of a master's degree is determined by the amount of academic credits earned. If you complete the set amount of academic credits and achieve the expected learning outcomes for a master's degree, the master's degree program is considered fully completed. The master's degree program has at least 60 academic credits for the entire period of study, including all types of educational and practical activities of a master's student.

Planning the content of education, the method of organizing and conducting the educational process is carried out by the University and scientific organization independently on the basis of credit technology of training.

The master's degree program of the profile direction implements educational programs of postgraduate education for the training of engineering personnel for production and design organizations that have in-depth profile and research training.

The content of the master's degree program consists of:

- 1) theoretical training, including the study of cycles of basic and core disciplines;

- 2) practical training of undergraduates: various types of practices, scientific or professional internships;

3) experimental research work, including the implementation of a master's thesis – for a specialized master's degree

4) final certification.

The professional activities of graduates of the program cover the field of electric power engineering, electric power networks and systems, power supply, electromechanics and renewable energy.

The direction of the specialty and specializations program relates to engineering and engineering.

Objectives of the educational program

Based on the achievements of modern science, technology and production, give knowledge and skills in the field of:

- production of electric energy and substations;
- electric power networks and systems;
- power supply of enterprises;
- renewable energy.

In case of successful completion of the full course of the master's degree, the graduate is awarded the academic degree "Master of engineering and technology in engineering and engineering".

The master's degree program "electrical Engineering and power engineering" differs from the existing educational program in the specialty 6M071800 - "Electric power engineering" by updating the internal content of the disciplines. The master's degree program provides for further deepening of the competencies acquired in the bachelor's degree. In this regard, the program includes modern innovative disciplines:

- energy management system according to international standards;
- modern high-voltage equipment;
- installation, adjustment and operation of electrical equipment.

During the development of the educational program, the master of engineering and technology in the field of electric power industry must acquire the following key competencies:

- search, analyze and process information to solve the set production tasks;
- use modern information technologies to solve applied problems;
- choose analytical and numerical methods when developing mathematical models of electrical installations and systems, technological processes in the electric power industry;
- know the methods of calculation and selection of power energy converters and conversion equipment;
- use modern systems and methods of Electromechanical energy conversion;
- know the methods of calculation and selection of renewable energy sources;

- develop plans for the organization of innovative activities in the enterprise;
- evaluate innovative and technological risks when implementing new technologies;
- have practical skills in maintenance, repair and diagnostics of industrial digital control systems for electric drives;
- demonstrate the ability to select and use methods and methods for optimizing power grids;
- possess the ability to install, test, set up and put into operation electric power and electrical equipment;
- organize and carry out operation, repair and maintenance of industrial electrical installations;
- know how to protect against overvoltage, insulation testing methods and operating principles of test installations;
- know the types of high-voltage electrical technologies used;
- be able to use methods for modeling electrical installations and electrical systems.

The educational program "Electrical and power Engineering" provides training for masters in the following activities:

Design and development activities

- ability to create and develop various simulation models and electrical circuits;
- knowledge to carry out technological and electric power calculations, choose electrical and Electromechanical equipment;

Design and technological activities

- ability to justify effective operating parameters and indicators of the electric power system;
- knowledge to develop energy-efficient, resource-saving technologies and measures to protect the environment;
- skills to create a business plan for a technology project;

Organizational and management activities

- ability to organize team activities, make work plans and set tasks;
- ability to carry out activities for the organization of production, develop and compile the necessary documentation;
- ability to solve issues of material and technical support and control the execution of tasks.

2 Requirements for applicants

The previous level of education of applicants is higher professional education (bachelor's degree). The applicant must have a diploma of the established sample and confirm the level of knowledge of the English language with a certificate or diplomas of the established sample.

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The procedure for admission of citizens to the master's program is established in accordance with the "Standard rules for admission to training in educational organizations that implement educational programs of postgraduate education".

The formation of a contingent of undergraduates is carried out by placing a state educational order for the training of scientific and pedagogical personnel, as well as paying for training at the expense of citizens' own funds and other sources. The state provides citizens of the Republic of Kazakhstan with the right to receive free postgraduate education on a competitive basis in accordance with the state educational order, if they receive this level of education for the first time.

At the "entrance", a master's student must have all the prerequisites necessary for mastering the corresponding master's degree program. The list of necessary prerequisites is determined by the higher education institution independently.

In the absence of the necessary prerequisites, the master's student is allowed to master them on a paid basis.

Admission to the University is carried out on the application of an applicant who has completed the full bachelor's course in the program "electric power" in accordance with the points of the certificate issued based on the results of testing in the Republican testing Center for: English, theoretical foundations of electrical engineering, electric machines

Special requirements for admission to the program apply to graduates of related educational programs: heat power engineering, automation and management.

3 Requirements for completing studies and obtaining a diploma

Degree/ qualifications awarded: The graduate Of this educational program is awarded the academic degree "master" of engineering and technology in the field.

A graduate who has completed master's programs must have the following General professional competencies:

- the ability to independently acquire, comprehend, structure and use new knowledge and skills in professional activities, develop their innovative abilities;
- the ability to independently formulate research goals, establish the sequence of professional tasks;
- ability to apply in practice knowledge of fundamental and applied sections of disciplines that determine the direction (profile) of the master's program;
- the ability to critically analyze, present, defend, discuss and disseminate

the results of their professional activities;

- proficiency in the preparation and execution of scientific and technical documentation, scientific reports, reviews, reports and articles;
- willingness to lead a team in the field of their professional activities, tolerantly accepting social, ethnic, religious and cultural differences;
- readiness to communicate orally and in writing in a foreign language to solve professional tasks.

A graduate who has completed the master's program must have professional competencies that correspond to the types of professional activities that the master's program is focused on:

- the ability to create and research models of the studied objects based on the use of in-depth theoretical and practical knowledge in the field of production, transmission and consumption of electric energy;
- the ability to independently conduct production and research-and-production field, laboratory and interpretation work in solving practical problems;
- the ability to professionally operate modern field and laboratory equipment and devices in the field of master's degree programs;
- readiness to use practical skills in organizing and managing research and production activities in solving professional problems;
- readiness for the practical use of regulatory documents in the planning and organization of research and production works.

When developing a master's program, all General cultural and professional competencies, as well as professional competencies related to the types of professional activities that the master's program is focused on, are included in the set of required results of mastering the master's program

Mandatory standard requirements for completing a master's degree and obtaining the academic degree of master of technical Sciences: mastering at least 60 academic credits of theoretical training, passing the state exam in the specialty, preparing and defending the final dissertation before the SAC.

Special requirements for completing a master's degree in this program,

the graduate must know:

- methods for building modern electric power and Electromechanical systems;
- current trends in the development of electrical equipment and electrical installations, technical means and automation systems for electric power facilities;
- standards and industry rules, methodological and regulatory materials that accompany the operation, installation, commissioning and design of electric power systems;

be able to:

- develop and research traditional and Autonomous electric power systems using modern technical and technological means.

4. The curriculum of the educational program

4.1. Duration of training 1 year

WORKING CURRICULUM												
<i>Education program 7M07131 - "Electrical engineering and power engineering"</i>												
<i>Group of Educational Programs M099 - "Power engineering and electrical engineering"</i>												
<i>enrolment for 2020 - 2021 academic year</i>												
Form of study: daytime				Term of study: 1 year				Academic degree: Master				
year of study	Code	Name of course	Component	Academic credits	lec/ lab/ prac/MSIW	Prerequisites	Code	Name of course	Component	Academic credits	lec/ lab/ prac/MSIW	Prerequisites
1	1 semester						2 semester					
	LNG202	Foreign language (professional)	BD IC	6	0/0/3/3	no	AAP248	Work placement	PS	7		
	MNG274	Management	BD IC	6	2/0/1/3	no	AAP207	Master's student experimental research work, including internship and master's project implementation	MSERW	13		
	HUM204	Management Psychology	BD IC	4	1/0/1/2	no	ECA206	Registration and defense of the master's project (RaDMP)	FA	12		
	ERG209	Intelligent energy-saving control system of technological processes	BD OC	4	1/0/1	no						
	ERG238	Management of Electromechanical systems										
	ERG269	Renewable energy sources				2/0/1/3	no					
	ERG253	ASDC and optimization of the modes of power supply systems	PS OC	6	2/1/0/3	no						
	ERG217	Installation, commissioning and operation of electrical equipment				2/1/0/3	no					
	ERG241	Operation of electric power systems and networks	PS OC	6	2/1/0/3	no						
	ERG246	Modern high voltage equipments										
	ERG206	High-voltage electrical technologies and equipment	PS OC	6	2/0/1	no						
		Бcero			38			Бcero			32	
										70		

5 Descriptors of the level and scope of knowledge, skills And competencies

Requirements for the level of training of a master's student are determined on the basis of the Dublin descriptors of the second level of higher education (master's degree) and reflect the acquired competencies expressed in the achieved learning results.

Learning outcomes are formulated at the level of the entire master's degree program, as well as at the level of individual modules or academic discipline.

Descriptors reflect learning outcomes that characterize the student's abilities:

1) demonstrate developing knowledge and understanding in the field of electric power networks and systems, power supply, relay protection and automation, renewable energy, based on advanced knowledge in the field of electric power, electrical engineering and electromechanics, when developing and (or) applying ideas in the context of research;

2) apply your knowledge, understanding, and skills at a professional level to solve problems in a new environment, in a broader interdisciplinary context;

3) collect and interpret information to form judgments based on social, ethical and scientific considerations;

4) clearly and unambiguously communicate information, ideas, conclusions, problems and solutions to both specialists and non-specialists;

5) training skills necessary for independent continuation of further training in the field of electric power, electrical engineering and electro-mechanics.

6 Competencies at the end of training

6.1 Requirements for the core competencies of graduates of a specialized *master's degree*, must:

1) *have an idea of:*

- current trends in the development of scientific knowledge;
- contradictions and socio-economic consequences of globalization processes;

2) *know:*

- methodology of scientific knowledge;
- principles and structure of scientific activity organization;

3) *be able to:*

- use the acquired knowledge for original development and application of ideas in the context of scientific research;

- critically analyze existing concepts, theories and approaches to the analysis of processes and phenomena;

- integrate knowledge gained in different disciplines to solve research problems in new unfamiliar conditions;
 - through the integration of knowledge to make judgments and to make decisions based on incomplete or limited information;
 - conduct information-analytical and information-bibliographic work with the involvement of modern information technologies;
 - creative thinking and creative approach to solving new problems and situations;
 - be fluent in a foreign language at a professional level that allows you to conduct research and teach special subjects in higher education institutions;
 - summarize the results of research and analytical work in the form of a dissertation, scientific article, report, analytical note, etc.;
- 4) *have the following skills:*
 - professional communication and cross-cultural communication;
 - oratory, correct and logical design of their thoughts in oral and written form;
 - expanding and deepening the knowledge necessary for daily professional activities.
- 5) *be competent:*
 - in the field of research methodology;
 - in the implementation of scientific projects and research in the professional field;
 - in ways to ensure constant updating of knowledge, expansion of professional skills and abilities.

B-basic knowledge and skills

B1-capable of philosophical analysis of social phenomena, personal behavior, and other phenomena. Ready to conduct a philosophical assessment of social phenomena;

B2-know and apply the basics of engineering professional ethics in practice;

B3 – be able to analyze current issues in the modern history of Kazakhstan.

P-professional competencies

P1 – a wide range of theoretical and practical knowledge in the professional field;

P2-is able to analyze electrical circuit diagrams and wiring diagrams of electric power systems.

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P3-ready to install, set up and operate Electromechanical and electrical systems;

P4-ready to participate in the development and design of new traditional and alternative energy facilities.

O-universal, social and ethical competencies

O1-is able to use English fluently as a means of business communication, a source of new knowledge in the field of electrical engineering and energy.I am ready to use English in my professional activity in the field of electric power industry;

O2-is able to speak Kazakh (Russian) fluently as a means of business communication, a source of new knowledge in the field of electrical engineering and energy. I am ready to use Kazakh (Russian) language in my professional activity in the field of electric power industry;

O3-know and apply the basics of applied ethics and business communication ethics in your work and life;

O4-know and apply the basic concepts of professional ethics;

O5-know and solve problems of human impact on the environment.

C-special and managerial competencies

C1-independent management and control of the processes of work and training activities within the framework of the organization's strategy, policy and goals, discussion of problems, reasoning of conclusions and competent handling of information;

C2-be a specialist in conducting experimental research of electric power facilities;

C3-be a research associate in the research of modern Electromechanical and electrical systems;

C3 – be an engineer for the development and design of electric power systems.

6.2 Requirements for research work of a master's student in a specialized master's program:

1) corresponds to the profile of the master's degree program in which the master's thesis is performed and defended;

2) relevant and contains scientific novelty and practical significance;

3) based on modern theoretical, methodological and technological achievements of science and practice;

4) is carried out using modern methods of scientific research;

5) contains research (methodological, practical) sections on the main

protected provisions;

6) based on international best practices in the relevant field of knowledge.

6.3 Requirements for the organization of practices

The educational program of the specialized master's degree includes practical training, which is conducted in parallel with theoretical training or in a separate period at the place of the dissertation.

Practical training is conducted for the purpose of familiarizing the master's student with the latest theoretical, methodological and technological achievements in the electric power industry, as well as processing and interpreting experimental data in practice.

7 Annex to the certificate according to the standard ECTS

The app is developed according to the standards of the European Commission, the Council of Europe and UNESCO/Sepes. This document serves only for academic recognition and is not an official confirmation of the document of education. It is not valid without a higher education diploma. The purpose of filling out the European application is to provide sufficient information about the diploma holder, the qualification they have received, the level of this qualification, the content of the training program, the results, the functional purpose of the qualification, as well as information about the national education system. The application model that will be used for transferring ratings uses the European credit transfer or transfer system (ECTS).

The European diploma Supplement provides an opportunity to continue education at foreign universities, as well as to confirm national higher education for foreign employers. When traveling abroad for professional recognition, additional legalization of the diploma of education will be required. The European diploma Supplement is completed in English upon individual request and is issued free of charge.

8 Description of disciplines

Foreign language (professional)

CODE-LNG205

CREDIT – 3 (0/0/3)

PREREQUISITES – AcademicEnglish, BusinessEnglish, IELTS 5.0-5.5

COURSE GOALS AND OBJECTIVES

The aim of the course is to develop students ' English language skills for their current academic research and to improve their performance in project management.

BRIEF DESCRIPTION OF THE COURSE

The course is aimed at developing vocabulary and grammar for effective communication in the field of project management and improving reading, writing, listening and speaking skills at the Intermediate level. Students are expected to acquire and expand their business English vocabulary and learn grammatical structures that are often used in the context of management. The course consists of 6 modules. The 3rd module of the course ends with an intermediate test, and the 6th module is followed by a test at the end of the course. The course ends with a final exam. Undergraduates also need to study independently (MIS). MIS - independent work of undergraduates under the guidance of a teacher.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Upon successful completion of the course, students are expected to be able to recognize the main idea and main message, as well as specific details when listening to monologues, dialogues and group discussions in the context of business and management; understand written and spoken English on topics related to management; write management texts (reports, letters, emails, meeting minutes) following a common structure with a higher degree of grammatical accuracy and using business words and phrases, talk about various business situations using the appropriate business vocabulary and grammatical structures - in pair and group discussions, meetings and negotiations.

Project management

CODE

CREDIT – 2 (1/0/1)

PREREQUISITE –no

The purpose and OBJECTIVES of the COURSE are to introduce future teachers to the methodological and theoretical foundations of higher school pedagogy, modern technologies for planning and organizing training and training, and the technology of teacher-student interaction.

BRIEF description of the COURSE pedagogical activity, personality and structure of pedagogical activity, modern requirements for competence, communicative competence of a University teacher, didactics of higher education, modern pedagogical technologies, higher education, modern pedagogical technologies, educational process. active methods and forms of training future specialists, educational work in higher education, organization of independent work of students on credit technology, organization of pedagogical control on credit technology.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

know and understand the current problems of pedagogical science, the laws of pedagogical theory, the essence of the pedagogical activity of a University teacher. Acquisition of skills in designing the educational process based on new concepts of training and education; Creation of a creative, developing environment in the process of training and education. Be competent in the problems of higher pedagogical education and prospects for their further development; effective University technologies; the main forms of pedagogical communication interaction, organization and management of students ' activities.

Theory and practice of relay protection

CODE-ERG234

CREDIT – 3 (2/0/0)

PREREQUISITE – no

THE purpose and OBJECTIVES of the COURSE are to master the principles of relay protection for masters, modern methods of calculating knowledge, knowledge of the main elements and means of relay protection. The objective of the subject is to expand the understanding of relay protection capabilities; to combine theoretical material on relay protection devices and devices, their main properties, and methods of application; to master the skills necessary for calculating relay protection; to choose the right methods and tools for relay protection; to Evaluate the effectiveness and reliability of the selected relay protection.

BRIEF description of the COURSE - characteristics of relay protection, algorithms and principles of building protection and methods for calculating various EP.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE information, methodological and mathematical support for the implementation of relay protection systems; domestic and foreign experience, as well as prospects for the development of relay protection systems; methods for calculating relay protection systems. know: - basic concepts, definitions and purpose of relay protection ; - requirements for relay protection; - principles of building relay protection; - elements and functional parts of relay protection devices; - Principles of basic protection schemes with relative and absolute selectivity;

It is necessary to: - calculate the main parameters of relay protection circuits; - select modern elements and devices of relay protection, analyze their efficiency and reliability; - Read various circuit diagrams and circuit diagrams for relay protection in the power generation system.

Microprocessor relay protection

CODE-ERG211

CREDIT – 2 (2/0/0)

PREREQUISITE – no

THE purpose and OBJECTIVES of the COURSE are to master the principles of relay protection for masters, modern methods of calculating knowledge, knowledge of the main elements and means of relay protection. The objective of the subject is to expand the understanding of relay protection capabilities; to combine theoretical material on relay protection devices and devices, their main properties, and methods of application; to master the skills necessary for calculating relay protection; to choose the right methods and tools for relay protection; to Evaluate the effectiveness and reliability of the selected relay protection.

BRIEF description of the COURSE - characteristics of relay protection, algorithms and principles of building protection and methods for calculating various EP.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

- information, methodological and mathematical support for the implementation of relay protection systems; domestic and foreign experience, as well as prospects for the development of relay protection systems; methods for calculating relay protection systems. know: - basic concepts, definitions and purpose of relay protection ; - requirements for relay protection; - principles of building relay protection; - elements and functional parts of relay protection devices; - Principles of basic protection schemes with relative and absolute selectivity;

It is necessary to: - calculate the main parameters of relay protection circuits; - select modern elements and devices of relay protection, analyze their efficiency and reliability; - Read various circuit diagrams and circuit diagrams for relay protection in the power generation system.

Renewable energy sources

CODE-ERG205

CREDIT – 3(1/1/1)

PREREQUISITE-ERG220

COURSE GOALS AND OBJECTIVES

The discipline focuses on knowledge gained in chemistry, biology, physics, and the theoretical foundations of electrical engineering. Connects them with special disciplines, processes and technologies in renewable energy sources and industries. It also shows their connection with special disciplines, processes and technologies for obtaining renewable energy sources from the relevant materials used.

BRIEF DESCRIPTION OF THE COURSE

The main factors that determine the degree of use of any energy source are its estimated reserves, the actual output of useful energy, cost, potential dangerous environmental impacts, as well as social consequences and impact on state security.

Renewable energy sources include hydrogen, bioethanol and biogas produced artificially from agricultural biological waste, as well as solar, water, wind, sea waves, tides, and hydroelectric power plants.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

In the course of studying the discipline, students should understand the concept of providing electricity consumers, understand the structure of the electric power industry, the relationship between its various links, have an idea of the latest achievements in obtaining renewable energy sources, and get an idea of the composition of electricity consumers in various industries.

Energy management system according to international standards

CODE-ERG243

CREDIT – 2 (1/0/1)

PREREQUISITE – no

COURSE GOALS AND OBJECTIVES

Prepare a specialist to solve problems of design, research and operation of electric power and electrotechnological installations and systems, who can analyze the efficiency of energy conversion schemes, evaluate the prospects of new methods of energy production and implement innovative developments.

BRIEF DESCRIPTION OF THE COURSE

The discipline covers the following theoretical information about the state of development of modern electric power industry:

- structure and operation of modern power stations of various types and electric networks;
- principles of construction, structure and optimization of the electric power system of an industrial enterprise;
- scale, directions and prospects of energy production and distribution;
- methods of obtaining and quality requirements for new types of electrical technology;
- regulatory and technical framework for energy saving;
- fundamentals of energy audit of electric power facilities;
- principles of waste-free technology, fuel and energy indicators of waste-free;
- environmental aspects of energy saving.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

- ability to identify promising areas in the energy sector;
- understand General and specific problems in the energy sector;
- read and quote scientific literature;
- analyze a scientific publication;
- use scientific methods of analysis.

Installation, commissioning and operation of electrical equipment

CODE-ERG217

CREDIT – 3 (2/1/0)

PREREQUISITE – ERG232, ERG235

COURSE GOALS AND OBJECTIVES

The purpose of studying the discipline is to form theoretical knowledge and master organizational and technical issues of rational operation and advanced industrial methods of installation, commissioning, operation and diagnostics of electrical equipment.

BRIEF DESCRIPTION OF THE COURSE

The discipline "Installation, adjustment and operation of electrical equipment" is a basic subject where students study the accumulated experience of modern methods of organizing and performing work on installation, adjustment and maintenance of electrical installations and automation equipment based on regulatory documents; safety rules, devices and technical operation.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

As a result of studying this discipline, a master's student must have a systematic, integrated approach to solving the issues of choosing, placing equipment, performing installation, commissioning, operation, maintenance and repair, as well as using it for its intended purpose.

Undergraduates acquire skills on industrial installation, repair and maintenance of elements of electric power network in accordance with the requirements of rules of technical operation of electrical installations, safety regulations for operation of electrical installations and the rules of device of electrical installations.

Operation of electric power systems and networks

CODE-ERG241

CREDIT – 3 (2/1/0)

PREREQUISITE – no

COURSE GOALS AND OBJECTIVES

Familiarized with the main tasks and organizational issues of technical operation, as well as operational reliability issues.

Proper planning and implementation of preventive maintenance, planning and calculation of the number of spare parts, as well as ways to improve operational reliability.

BRIEF DESCRIPTION OF THE COURSE

The discipline is based on the knowledge obtained in the courses: electric power engineering, electro-mechanics and electrical equipment, electric machines, electric machines, electrical appliances, power supply of enterprises, electric power networks and systems, electrical part of power plants, relay protection and automation of power supply systems, basics of electrical safety.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

The knowledge obtained by undergraduates in the study of the discipline "Operation of electric power systems and networks" should provide the final cycle of training on the operation of electrical equipment of industrial enterprises and electrical installations, electric power systems and networks, as well as on some issues of operational reliability.

Modern high-voltage equipment

CODE-ERG236

CREDIT – 3 (1/1/1)

PREREQUISITE – no

The purpose and OBJECTIVES of the COURSE are to Acquire knowledge about the basic information, about the nature of the breakdown of dielectrics, about the design features of high-voltage insulation, about the mechanisms of defects in insulation and methods of its control, about overvoltages and methods of protection against them.

BRIEF DESCRIPTION OF THE COURSE

The main provisions of solid state physics, physical phenomena under the influence of strong electromagnetic fields on gases, liquid and solid dielectrics, the effects of overvoltages arising from direct lightning strikes in objects and transmission lines.

It is based on the knowledge, skills and abilities obtained in the previous study of the disciplines "electrical materials", "Electrical part of the station and substation", "Electrical networks and systems" studied by undergraduates in previous courses.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Research work in the scientific and pedagogical master's degree program should:

- correspond to the main problems of the specialty in which the master's thesis is being defended;
- to be actual, to contain scientific novelty and practical significance;
- be based on modern theoretical, methodological and technological achievements of science and practice;
- be done using contemporary scientific research methods;
- contain research (methodological, practical) sections on the main protected provisions;
- be based on international best practices in the relevant field of knowledge.
- be done with the use of advanced information technology;

High-voltage equipment

CODE-ERG206

CREDIT – 2 (1/0/1)

PREREQUISITE – no

COURSE GOALS AND OBJECTIVES

Testing of high-voltage equipment is carried out in order to:

- * check the rated characteristics of electrical equipment and determine its performance;
- * determination of the technical condition of electrical equipment, power and lighting networks;
- * search for cable damage locations;
- * assessment of potential safety and stable operation of the equipment during subsequent operation;
- * ensuring normal power supply to the facility.

High-voltage tests help to avoid overloads and mechanical damage to electrical equipment, ensure its trouble-free operation and long service life. The efficiency and safety of using electrical equipment depends on how professional and timely the necessary checks are carried out. Therefore, such checks should be carried out by a well-equipped high-voltage testing laboratory, which is staffed by thoroughly trained specialists with extensive experience.

BRIEF description of the COURSE - this is a category of electrical appliances and devices, the main purpose of high-voltage equipment is to perform a number of functions of testing electrical equipment, as well as solving measurement problems in industrial energy and power supply of various industrial facilities. The complexity of the scope of high-voltage devices explains the increased requirements for the reliability, safety and quality of such electrical equipment.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

The educational program of the specialized master's program includes industrial practice.

The master's industrial practice is conducted in order to get acquainted with the latest theoretical, methodological and technological achievements at energy enterprises, with modern methods of scientific research, processing and interpretation of experimental data.

EXPERIMENTAL RESEARCH WORK OF A MASTER'S STUDENT

- Experimental research work in a specialized master's program should:
- correspond to the main problems of the specialty in which the master's thesis is being defended;
 - to be actual, to contain scientific novelty and practical significance;
 - be based on modern theoretical, methodological and technological achievements of science and practice;
 - be done using contemporary scientific research methods;
 - contain research (methodological, practical) sections on the main protected provisions;
 - be based on international best practices in the relevant field of knowledge.
 - be done with the use of advanced information technology;
 - - contain experimental research (methodological, practical) sections on the main protected provisions.

Master's thesis defense

CODE-ECA206

CREDIT – 12

The purpose of the master's thesis is to demonstrate the level of applied/research qualifications of the master's student, the ability to independently conduct scientific research, test the ability to solve specific scientific and practical problems, knowledge of the most General methods and techniques for solving them.

BRIEF DESCRIPTION

Master thesis – graduation qualification scientific work, which is a generalization of the results of independent studies undergraduates one of the pressing problems of a particular specialty relevant branch of science that has internal unity and reflects the progress and results of the development of the chosen topic.

Master's thesis-the result of experimental research work of a master's student, conducted during the entire period of study of a master's student.

Master's thesis defense is the final stage of master's degree preparation. The master's thesis must meet the following requirements:

- the work should conduct research or solve current problems in the field of electrical engineering and power engineering;
- the work should be based on identifying important scientific problems and solving them;
- decisions must be scientifically sound and reliable, and have internal unity;
- the dissertation work must be written individually.

Content

- 1 scope and content of the program
- 2 requirements for applicants
- 3 Requirements for completing studies and obtaining a diploma
- 4 working curriculum of the educational program
- 5 Descriptors of the level and scope of knowledge, skills, and competencies
- 6 Competencies at the end of training
- 7 Annex to the certificate according to the standard ICES
- 8 description of disciplines