Ф.7.02-09

MINISTRY OF SCIENCEs AND higher EDUCATION OF THE REPUBLIC KAZAKHSTAN

M.O. AUEZOV SOUTH KAZAKHSTAN UNIVERSITY

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|  | «APPROVED»  Chairman of the Board -  Rector\_\_\_\_\_\_\_\_  Doctor of historical sciences,  Academician, Kozhamzharova D.P.  «\_\_\_»\_\_\_\_\_\_\_\_\_\_2022 y. |

[**EducationAL Program**](https://context.reverso.net/%D0%BF%D0%B5%D1%80%D0%B5%D0%B2%D0%BE%D0%B4/%D0%B0%D0%BD%D0%B3%D0%BB%D0%B8%D0%B9%D1%81%D0%BA%D0%B8%D0%B9-%D1%80%D1%83%D1%81%D1%81%D0%BA%D0%B8%D0%B9/Education+Programme)

6В07150- Electric Power Engineering

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| [Registration number](https://context.reverso.net/%D0%BF%D0%B5%D1%80%D0%B5%D0%B2%D0%BE%D0%B4/%D0%B0%D0%BD%D0%B3%D0%BB%D0%B8%D0%B9%D1%81%D0%BA%D0%B8%D0%B9-%D1%80%D1%83%D1%81%D1%81%D0%BA%D0%B8%D0%B9/Registration+number) | 6В07100034 |
| Code and Classification of Education | 6В07 Engineering, Manufacturing and Civil Engineering |
| Code and Classification of Areas of Training | 6В071 Engineering and Engineering Trades |
| Group of educational programs (EP) | В062 Electrical Engineering and Energy |
| Typeof EP | Acting |
| ISCE level | 6 |
| NQFlevel | 6 |
| IQF level | 6 |
| Language learning | Kazakh, Russian, English |
| The complexity of EP | 240 credits |
| Distinctive features of EP | - |
| Partner University (JEP) | - |
| University partner (DDEP) | - |

Shymkent, 2022у.

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1. **CONCEPT OF THE PROGRAM**

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| **University Mission** | Generation of new competencies, training of a leader who translates research and entrepreneurial thinking and culture |
| **University Values** | • Openness–open to change, innovation and cooperation.  • Creativity – generates ideas, develops them and turns them into values.  • Academic freedom – free to choose, develop and act.  • Partnership – creates trust and support in a relationship where everyone wins.  • Social responsibility – ready to fulfill obligations, make decisions and be responsible for their results. |
| **Graduate Model** | • Deep subject knowledge, their application and continuous expansion in professional activity.  • Information and digital literacy and mobility in rapidly changing conditions.  • Research skills, creativity and emotional intelligence.  • Entrepreneurship, independence and responsibility for their activities and well-being.  • Global and national citizenship, tolerance to cultures and languages. |
| **The uniqueness of the educational program** | • Orientation to the regional labor market and social order through the formation of professional competencies of the graduate, adjusted to the requirements of stakeholders  • Practical orientation and emphasis on the development of critical thinking and entrepreneurship, the formation of a wide range of skills that will allow to be functionally literate and competitive in any life situation and be in demand in the labor market |
| **Academic Integrity and Ethics Policy** | The University has taken measures to maintain academic integrity and academic freedom, protection from any kind of intolerance and discrimination:  • Rules of academic integrity (Minutes of the Academic Council №. 3 dated 30.10.2018);  • Anti-Corruption Standard (Order № 373 n/k dated 27.12.2019).  • Code of Ethics (Protocol of the Academic Council №. 8 dated 31.01.2020). |
| **Regulatory and legal framework for the development of EP** | 1. Law of the Republic of Kazakhstan "On Education";  2. Standard rules of activity of educational organizations implementing educational programs of higher and (or) postgraduate education, approved by Order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018№ 595 with amendments and additions dated December 29, 2021 №. 614  3. State obligatory standards of higher and postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated July 20.2022№. 2;  4.Rules for organizing the educational process on credit technology of education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 № 152;  5.Qualification directory of positions of managers, specialists and other employees, approved by order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated December 30,2020 № 553.  6. Guidelines for the use of ECTS.  7. Guidelines for the development of educational programs for higher and postgraduate education, Appendix 1 to the order of the Director of the Center for the Bologna Process and Academic Mobility № 45 o/d dated June 30, 2021 |
| **Organization of the educational process** | • Implementation of the principles of the Bologna Process  • Student-centered learning  • Availability  • Inclusivity |
| **Quality assurance of the Educational program** | • Internal quality assurance system  • Involvement of stakeholders in the development of the Educational Program and its evaluation  • Systematic monitoring  • Actualization of the content (updating) |
| **Requirementsи for applicants** | It is established according to the Model Rules for admission to training in educational organizations, implementing educational programs of higher and postgraduate education, Order of the Ministry of Education and Science of the Republic of Kazakhstan № 600 dated 31.10.2018 |

1. **PASSPORT OFTHE EDUCATIONAL PROGRAM**

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| **Purpose of the EP** | Preparation of highly qualified, competitive in the labor market specialists in the field of electricity, capable of self-development and the implementation of core activities according to the qualifications of a bachelor of engineering and technology. |
| **Tasks of the EP** | **-**the formation of socially responsible behavior in society, an understanding of the significance of professional ethical norms and adherence to these norms;  - providing basic undergraduate training in the electric power industry , that allows you to continue learning throughout life, to successfully adapt to changing conditions throughout their professional careers;  - ensuring the conditions for acquiring a high general intellectual level of development, mastering literate and developed speech, a culture of thinking and the skills of scientific organization of labor in the field of electrical power engineering;  - creation of conditions for intellectual, physical, spiritual, aesthetic development to ensure the possibility of their employment in the specialty or continuing education at subsequent levels of education  - the formation of the needs of bachelors for cognitive interest in research and development activities in the field of electricity. |
| **Harmonization of EP** | **•** 6th level of the National Qualifications Framework of the Republic of Kazakhstan;  • Dublin descriptors of the 6th level of qualification;  • 1 cycle of a Framework for Qualification of the European Higher Education Area);   * • 6thLevel of European Qualification Framework for Life long Learning). |
| **Connection of the EP with the professional sphere** | The industry qualifications framework «Energy», approved by the protocol of the Industry Commission on Social Partnership and Regulation of Social and labor relations of the energy industry №. 05-13-3-4/PRot«25» July 2019.  Professional standards: «Operation and repair of electrical equipment» dated 02.05.2019, №. 86.Appendix 3; «Forecast of electricity and power consumption» dated 12/18/2019, №. 255, Appendix 38; «Maintenance, installation and commissioning of electrical equipment» dated 06/24/2020 № 132, Appendix 1. |
| **Name of the degree awarded** | After the successful completion of this EP, the graduate is awarded «Bachelor of Engineering and Technology» of the educational program  6B07150 - Power Engineering. |
| **List of qualifications and positions** | Positionsas technologists, specialists, head sofdepartments at leading enterprises of electricity production and distribution, as wellas in engineering and energyservice companies, design organization sthatmeetthe qualification requirement sof the Qualification Directory of positions of managers, specialists and otheremployees, approvedby the Order ofthe Minister of Labor and Social Protectionofthe Population of the Republic of Kazakhstan dated December 30, 2020 No. 553 and with an Appendix tothe Industry Qualifications Framework "Transmission and distributionof Electric Energy" approvedby Protocol No. 12-03-333 dated November 17, 2016 |
| **Field of professional activity** | The sphere of professional activity is the field of science and technology, which includes a set of technologies, means, methods and methods of human activity aimed at creating conditions for the conversion of electrical energy and process control. |
| **Objects of professional activity** | The objects of professional activity of graduates are: all industrial, electric power, electrotechnological and research enterprises associated with electrotechnological installations and electromechanical control systems. |
| **Subjects of professional activity** | - electromechanics;  - electrotechnological installations and systems;  - electric transport;  - electrical equipment of vehicles  -electric drive and automation of technological systems. |
| **Types of professional activity** | - design engineering;  - production and technology;  - organizational and managerial;  - scientific research;  - installation and commissioning;  - service - operational;  - entrepreneurial. |
| **Learning outcomes** | **LO1** Communicate freely in a professional environment and society in Kazakh, Russian and English, applying the principles of academic writing and a culture of academic honesty.  **LO2** Present natural science, mathematical, social, socio-economic and engineering knowledge in professional activities, based on the methods of mathematical data processing, scientific and experimental research.  **LO3** Have information and computational literacy, the ability to generalize, analyze and perceive information, setting goals and choosing ways to achieve it.  **LO4** Develop a model of a digital control system for an electric drive, using innovative programs and data on the technological and design properties of the designed object.  **LO5** Create models of electromagnetic processes in electrical machines, converting devices and systems using modern calculation methods.  **LO6** Develop plans, programs and methods for the installation, adjustment, operation and testing of electrical equipment, diagnostic and repair measures for electrical equipment, using the main methods and schemes of installation and dismantling.  **LO7** Ensure the reliability of electric power systems and the quality of electricity by analyzing the functionality of local electrical systems, intelligent technologies and principles of modern design of electric power systems.  **LO8** Develop a feasibility study of measures to improve the operation of equipment in compliance with safety and labor protection standards  **LO 9** Use research, entrepreneurial, and uncertainty-based skills.  **LO 10** Demonstrate the skills of self-education, self-education, healthy lifestyle, teamwork. |

**3. COMPETENCES OF THE GRADUATE OF EP**

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| **SOFT SKILLS**. Behavioral skills and personality qualities | |
| SS 1. Competence in managing one's own literacy | SS1.1. The ability of self-learn, self-develop and constantly update their knowledge within the chosen trajectory and in an interdisciplinary environment.  SS1.2. The abilityto express thoughts, feelings, facts and opinions in the professional field.  SS1.3. The abilityformobility in the modern world and criticalthinking. |
| SS 2. Language competence | SS2.1. The ability tobuild communication programs in thestate, Russian and foreignl anguages.  SS2.2. The ability for interpersonal social and professional communication in the conditions of intercultural communication. |
| SS 3. Mathematical Competence and Competence in the field of Science | SS3.1. The ability and willingness to apply the educational potential, experience and personal qualities acquired during the study of mathematical, natural science, technical disciplines at the university to solve professional problems. |
| SS 4. Digital competence, technological literacy | SS4.1. The ability to demonstrate and develop information literacy through the mastery and use of modern information and communication technologies in all areas of their lives and professional activities.  SS4.2. The ability to use various types of information and communication technologies: Internet resources, cloud and mobile services for searching, storing, protecting and disseminating information. |
| SS 5. Personal, social and academic competencies | SS5.1.The ability for physical self-improvement and focus on a healthy lifestyle to ensure full-fledged social and professional activities through the methods and means of physical culture.  SS5.2. The aility to social and cultural development based on the manifestation of citizenship and morality.  SS5.3 The ability to build a personal educational trajectory throughout life for self-development, career growth and professional success.  SS5.4. The ability to successfully interact in a variety of socio-cultural contexts during study, work, home and leisure. |
| SS 6. Entrepreneurial competence | SS6.1. The ability to be creative and entrepreneurial in a variety of environments.  SS6.2. The ability to work in a mode of uncertainty and rapidly changing task conditions, make decisions, allocate resources and manage your time.  SS6.3. The ability to work with consumer requests. |
| SS 7. Cultural awareness and ability to express yourself | SS7.1. The ability to show worldview, civil and moral positions.  SS7.2. The ability to be tolerant of the traditions and culture of other peoples of the world, to have high spiritual qualities. |
| **PROFESSIONAL COMPETENCIES** (HARD SKILLS). | |
| Theoretical knowledge and practical skills specific to this field | PC1-the ability to demonstrate the necessary knowledge to establish the parameters of the optimal operating mode and determine the composition of electrical equipment, to ensure compliance with all the required operating modes and to conduct a technical, economic and environmental analysis of machines, mechanisms, installations and electric drive systems; |
| PC2-the ability to analyze and evaluate the technical condition and residual life of electrical equipment, create  theoretical models that allow you to predict the properties and processes of the electric drive, develop plans, programs and methods for testing and diagnosing electrical equipment and electric drive systems; |
| PC3-the ability to plan work on the commissioning of electrical equipment, to participate in installation and adjustment work, in acceptance tests of electrical equipment, to operate mechanisms, installations and systems of electric drive; |
| PK4-ability to use methods of analysis and modeling of the -oretical and experimental research in solving professional problems |
| PK5-the ability to apply in design solutions the principles of functioning of electrical, converter, electronic elements and control systems of machines, mechanisms and technological complexes; |
| PC6 - the ability to participate in the design of objects of professional activity in accordance with the terms of reference and regulatory and technical documentation, observing various technical, energy efficient and environmental requirements, prepare and execute standard technical documentation. |

**3.1 MATRIX OF CORRELATING LEARNING OUTCOMES IN THE EP AS A WHOLE WITH THE FORMED COMPETENCIES**

|  |  |  |  |  |  |  |  |  |  |  |
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|  | **LО1** | **LО2** | **LО3** | **LО4** | **LО5** | **LО6** | **LО7** | **LО8** | **LО9** | **LО10** |
| GC1 | v | v |  |  |  |  |  |  |  | v |
| GC2 | v | v |  |  |  |  |  |  |  | v |
| GC3 |  | v |  |  |  |  |  |  | v |  |
| GC4 |  |  | v |  |  |  | v |  |  | v |
| GC5 | v | v |  |  |  |  |  |  |  | v |
| GC6 |  |  |  |  |  |  |  |  | v | v |
| GC7 |  | v |  |  |  |  |  |  | v |  |
| PC 1 |  |  | v | v |  |  |  | v |  | v |
| PC 2 |  |  |  |  | v | v | v |  |  |  |
| PC 3 |  |  |  |  |  | v | v | v |  |  |
| PC 4 |  |  |  | v | v |  | v |  |  | v |
| PC 5 |  |  | v | v | v |  |  |  |  | v |
| PC 6 |  |  |  | v |  |  | v | v | v | v |

1. **MATRIX OF THE INFLUENCE OF DISCIPLINES ON THE FORMATION OF LEARNING OUTCOMES AND INFORMATION ON LABOR INTENSITY**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| № | Module title | | Cycle | | UC/  EC | Component title | Brief discipline description | Num  ber of credits | Formed LО (codes) | | | | | | | | | | |
| LО1 | LО2 | LО3 | LО4 | LО5 | LО6 | LО7 | LО8 | LО9 | LО10 | |
|  | | Module of the Social Science | | GED | OC | History of Kazakhstan | The author studies the conceptual foundations of the national history, interprets the history, the continuity of the Kazakh statehood and the actual problems of the history of modern Kazakhstan. The article analyzes the activities of the national intelligentsia in the formation of the ideology of the liberation movement and the stages of socio-economic modernization of Kazakhstan. The creation of a democratic state governed by the rule of law is considered. | 5 |  | **v** | **v** |  |  |  |  |  |  | | **v** | |
|  | | GED | OC | Philosophy | The basics of the emergence of philosophy are considered, the peculiarities of the emergence of the culture of thinking are revealed, the concepts of «philosophy» «worldview», the essence and content of the concepts of «being», «consciousness»are revealed. The relationship between the concepts of «knowledge» and «creativity» is considered, the essence and content of the category of the philosophy of freedom are revealed. They develop the skills of correcting actions to highlight the essence of the philosophical problem of working individually and in a team, critical thinking, skills of research of philosophical aspects, problems of practice and cognition. | 5 |  | **v** | **v** |  |  |  |  |  |  | | **v** | |
|  | | Socio-political knowledge module | | GED | OC | Social and Political Studies | It studies the theories of sociology, the social structure and stratification of society, explains the role and place of politics in society, examines the main stages of the formation and development of political science, including youth policy, the role of politics in the system of public life, reveals the essence of the state, reveals the relationship between the state and civil society. They develop the skills of sociological research, analysis of socio-political activity and behavior. | 4 |  | **v** | **v** |  |  |  |  |  |  | | **v** | |
|  | | GED | OC | Cultural studies and psychology | The socio-ethical values of society as a product of integration processes in the systems of basic knowledge of the disciplines of the socio-cultural-psychological module are studied; the features of psychological institutions in the context of their role in the modernization of Kazakhstan's society are analyzed; programs for resolving conflict situations in society, including in professional society, are formed; skills to correctly express and defend one's own opinion are instilled. | 4 |  | **v** | **v** |  |  |  |  |  |  | | **v** | |
|  | | Social and Ethnic Development Module | | GED | HSC | Ecosystem and Law | Formation of integrated knowledge in the field of economics, law, anti-corruption culture, ecology and life safety, entrepreneurship, scientific research methods. Fundamentals of safe human-nature interaction, ecosystem and biosphere productivity. The entrepreneurial activity of society in conditions of limited resources, increasing the competitiveness of business and the national economy. Regulation of relations in the field of ecology and human life safety. Knowledge and compliance of Kazakhstan is law, obligations and guarantees of subjects, state regulation of public relations to ensure social progress. Application of scientific research methods. | 5 |  | **v** |  |  |  |  |  |  |  | | **v** | |
|  | | BD | EC | Actual Problems and Modernization of Public Consciousness | The state regulation of ecosystems and technologies in the sphere of civil law, basic concepts and terms of digitalization in the sphere of civil law, environmental legislation in Kazakhstan and abroad are studied. The basics of environmental law, specially protected natural territories, global problems of ecology, causes and consequences of environmental pollution are examined. Skills of rational nature management and use of eco-protective equipment and technology are taught. | 3 |  | **v** | **v** |  |  |  |  |  |  | | **v** | |
|  | | BD | EC | Abay Study | The life and creative legacy of Abay, the songs of the poems are studied. The social image of the Kazakh community in the works of Abay, the wisdom in Abay is poems (Abay is black words), the school of translation, Abay, etc.Considered aesthetic taste of Abay, science-based integrated learning. Analyzes the work of the great poet, writer, public figure, the founder of modern Kazakh written literature, philosophy, social, aesthetic views of poetry in Kazakh poetry, contribution to the development of poetic language and a wide range of research papers on the musical heritage. |  | **v** | **v** |  |  |  |  |  |  | | **v** | |
|  | | BD | EC | Mukhtar Study | The life and work of M.O.Auezov is studied; the creative laboratory of the writer, his biography in context with his work; as the creator of the science of Abaeology; the researcher of the «Manas» zhyr is analyzed. Acquaintance with M.Auezov as a prominent public figure. M.Auezov is literary heritage in the world and Eastern literature is analyzed. The feelings of patriotism and love for the homeland are inculcated. |  | **v** | **v** |  |  |  |  |  |  | | **v** | |
|  | | Communi-  cations and Physical Education Module | | GED | OC | Kazakh (Russian) language | The basics of development of cognitive and communicative activity in Russian (Kazakh) in the spheres of interpersonal, social, intercultural communication are studied. The skills of discussing ethical, cultural, socially significant norms in discussions, the ability to work in a team, team interaction, flexibility, creativity. Practical skills of interpreting text information, explaining their style, genre specificity in different communication spheres are developed | 10 | **v** | **v** |  |  |  |  |  |  |  | | **v** | |
|  | | GED | OC | Foreign language | Modern trends and requirements for learning and practical possession of foreign languages in everyday communication and professional activities are studied, aimed at improving the general and communicative culture of future professionals, improving communication skills and abilities, as well as increasing the quality of professional education. Fundamentals of foreign language are formed and systematized. | 10 | **v** | **v** |  |  |  |  |  |  |  | | **v** | |
|  | | GED | OC | Physical training | Historical preconditions of formation and development of physical education system on the territory of Kazakhstan, the role of physical culture and sport in the general education system, integration of physical education into the world educational space are studied. The skills of healthy lifestyle, individual and team work are imparted. | 8 |  |  |  |  |  |  |  |  |  | | **v** | |
|  | | BD | HSC | Professional Kazakh (Russian) Language | Formation of extraction of necessary information from the text, its interpretation in educational-professional communication. The ability to establish contacts at the professional level, to build competent communication, based on the goals and situation of communication is developed. The ability to creativity, innovation, collegiality, asserting their point of view in the process of building a program of speech behavior in Russian (Kazakh) in the sphere of professional communication is cultivated. | 3 | **v** | **v** |  |  |  |  |  |  |  | | **v** | |
|  | | BD | HSC | Professionally Oriented Foreign Language | Different types of speech activities in the areas of professional and scientific communication, communicative tasks of the text, microthemes of scientific text, the role of the sentence in the text, ways of development of information in the text, the main and additional information in the text are studied. Structural and semantic analysis of scientific texts, compression of scientific text, secondary scientific texts are formed. Skills of creating a plan in the scientific field are taught. | 3 | **v** | **v** |  |  |  |  |  |  |  | | **v** | |
|  | | GED | OC | Information and Communication Technologies (in English) | Different types of speech activities in the areas of professional and scientific communication, communicative tasks of the text, microthemes of scientific text, the role of the sentence in the text, ways of development of information in the text, the main and additional information in the text are studied. Structural and semantic analysis of scientific text, secondary scientific texts is formed. The skills of creating a plan in the scientific field are taught | 5 | **v** | **v** | **v** |  |  |  |  |  |  | |  | |
|  | | Mathematical and Natural Science Basics | | BD | HSC | Higher Mathematics | The use of determinants to find the inverse matrix is studied. The optimal solutions for systems of linear equations with two and three unknowns are argued. Ability to use formulas for finding scalar, vector and mixed product of vectors is formed. Skills of knowledge of the basic concepts of the theory of complex numbers, work individually and in teams in finding derivatives and integral of functions of one variable, solving curvilinear integrals of kind I and kind II are imparted. | 5 |  | **v** | **v** |  |  |  |  |  |  | |  | |
|  | | BD | EC | Theory of Probability and Mathematical Statistics | The basic concepts of functions of several variables, the ability to find partial derivatives, ordinary differential equations are studied. Ability to study extremum of functions of several variables is formed. Skills in computational literacy, solving multiple integrals, equations of different orders and types, theoretical knowledge of series theory for practical studies of their convergence are imparted | 4 |  | **v** | **v** |  |  |  |  |  | **v** | |  | |
|  | | BD | EC | Discrete Mathematics | Methods of calculating real roots of algebraic equations, solving numerically integrated functions, numerically integrated differential equations, probability theory, laws of distribution of random variables, characteristics of a random variable, mathematical statistics, sampling method, methods of statistical data processing are studied. The ability to apply methods of least squares, the classical definition of probability is formed. The skills of statistical evaluation of distribution parameters. Present modern methods of calculation in power supply systems. |  | **v** | **v** |  |  |  |  |  | **v** | |  | |
|  | | BD | HSC | Physics | The students study dynamic and statistical laws, changes of physical quantities and fundamental constants of natural science, principles of symmetry and conservation laws, laws and models of mechanics, electricity and magnetism, quantum and statistical physics, thermodynamics, zone theory of solid state. Methods of theoretical and experimental research in physics, methods of estimating the orders of physical quantities, skills of applying the apparatus of mathematical physics, processing of experimental data are considered. | 4 |  | **v** | **v** |  | **v** |  |  |  |  | |  | |
|  | | BD | EC | Physics2 | The notions of modern physical picture of the world, the essence of the basic ideas, laws of such sections as: magnetism, optics, quantum and nuclear physics are studied. The skills of mastering the logic of the development of physics as a science of real objects of nature, to conduct qualitative and quantitative research on the profile of the specialty with the help of modern physical scientific equipment. | 4 |  | **v** | **v** |  |  |  |  |  |  | |  | |
|  | | BD | EC | Solid State Physics | The structure and fundamentals of modern solid-state physics are studied, including general ideas about the structure of crystals and amorphous substances, methods of investigating the structure and various physical properties of solids, methods of determining crystal structures, electrical conductivity of metals. Types of interatomic bonds, crystal symmetry, magnetic and thermal properties of solids, X-ray structural analysis skills are taught. |  | **v** | **v** |  |  |  |  |  |  | |  | |
|  | | Fundamen  -tals of Engineering and Technical Sciences | | BD | HSC | Engineering and Computer Graphics | Computer graphics with the help of modern graphic packages, the basics of computer design in the formation of compositions, creating a unified style of design, image transfer is studied. The principles of creating and processing images using graphics packages, the basics of the perception of graphic images, the physics of color and light, types of graphics, features and principles of the formation of different types of graphics. The skills of performing general technical and specialized drawings in accordance with GOST in the AutoCAD design environment, 3D modeling, creating theoretical models of power supply objects. | 4 |  | **v** | **v** |  |  |  |  |  |  | | **v** | |
|  | | BD | EC | Mathematical Problems and Computer Modelling in the Electric Power Industry | Mathematical issues of power engineering and mathematical modeling of steady-state modes of power systems, transient processes using specialized computer and mathematical programs are studied. Skills in applying mathematical programming methods in solving electric power industry problems, probability theory and mathematical statistics methods in electric power industry problems, skills in solving optimization problems for different types of power plants and modes of electric networks are taught. | 5 |  | **v** | **v** | **v** | **v** |  |  |  |  | |  | |
|  | | BD | EC | Mathematical Modelling of Electric Power Facilities | Mathematical models of elements of electric power systems, methods of solution of linear equations, nonlinear models of steady-state modes, simulation of schemes of electric networks, static and dynamic models are studied. The skills of practical problem solving on modeling objects of power engineering, setting their geometry, properties, physical composition, modeling the behavior of the object in different environments, in statics, dynamics and development of recommendations for the study of the object are imparted. |  | **v** | **v** | **v** | **v** |  |  |  |  | |  | |
|  | | BD | HSC | Applied Mechanics | The basic concepts and axiomatics of mechanics are studied, the regularities of mechanical motion and methods of its calculation, the main historical stages of the development of theoretical mechanics, its current state and prospects for its development. The methods of calculating The methods of calculating mechanical motion for specific tasks, in particular tasks related to the profile of students, the features of the construction of mechanical links, apparatus and machines and their operation in conditions of low and high temperatures. Skills in the selection of dimensions and properties of elements of structures and equipment are taught. | 4 |  | **v** | **v** | **v** |  |  |  |  |  | |  | |
|  | | BD | HSC | Standardization and Certification | Basic concepts and methods of mathematical analysis, probability theory and mathematical statistics, technical and software tools of information technology implementation are studied. The use of external data carriers for data exchange between machines, creation of backups and archives of data and programs are examined. The skills of searching and exchanging information in global and local computer networks, making physical measurements, correct evaluation of errors in a physical experiment are taught. | 4 |  |  | **v** |  |  |  |  | **v** |  | |  | |
|  | | Funda  -mentals of Electrical Engineering | | BD | EC | Theoretical Fundamentals of Electrical  Technics І | Linear direct current circuits, single-phase sinusoidal current circuits, three-phase circuits, and linear circuits at non-sinusoidal currents and voltages are studied. Skills are imparted in the application of calculation methods to DC, single-phase, and three-phase current circuits. Symmetrical and asymmetrical problems in three-phase circuits with three-wire and four-wire power systems are examined. Methods of solving problems with non-sinusoidal currents are learned. Skills of setting up an experiment, making a diagram, teamwork, discussion and summarizing the results of the work are imparted. | 5 |  | **v** | **v** |  | **v** |  |  |  |  | |  | |
|  | | BD | EC | Theory of Electrical  Circuits I | The basic concepts of electric circuits and methods of calculation of direct current circuits, influence of harmonic oscillations on electric circuits, resonance phenomena in electric circuits, circuits with inductively coupled elements, three-phase circuits, periodic non-sinusoidal currents are studied. Problems with symmetrical and asymmetrical operation in three-phase circuits with three-wire and four-wire power systems are considered. Skills in the application of calculation methods to DC, single-phase, and three-phase circuits are taught. Methods of solving problems with non-sinusoidal currents are learned. Skills in setting up an experiment, making a diagram, teamwork, discussion and summarizing of the work are taught. |  | **v** | **v** |  | **v** |  |  |  |  | |  | |
|  | | BD | EC | Theoretical Fundamentals of Electrical Engineerig II | Transients in linear electrical circuits are studied. Skills in applying the laws of switching are taught. Four-pole and frequency electric filters are analyzed. Skills in determining the coefficients of a quadrupole are formed. Skills in calculating circuits with distributed parameters, determining currents, voltages in long lines are formed. Skills of setting up an experiment, making a circuit, teamwork, discussion and summarizing the results of the work are imparted | 6 |  | **v** | **v** |  | **v** |  |  |  |  | |  | |
|  | | BD | EC | Theory of Electrical  Circuits II | Transients in linear AC and DC electric circuits, quadrupoles and their substitution circuits, methods of constructing electric filters, circuits with distributed parameters, AC and DC circuits with nonlinear elements are studied. Skills in solving problems in a transient mode, determining the coefficients of the quadrupole. Skills in calculating, determining currents, voltages in long lines are formed. The skills of setting up an experiment, making a circuit, teamwork, discussion and summarizing the results of the work are imparted. |  | **v** | **v** |  | **v** |  |  |  |  | |  | |
|  | | BD | EC | Theoretical Fundamentals of Electrical Engineerig III | The theory of dc electric field, dc magnetic field, and alternating electromagnetic field is studied. The basic equations of electrostatics, electric field, magnetic field and alternating electromagnetic field are studied. Skills are instilled to identify the physical essence of phenomena and processes in devices of various physical nature, to perform technical calculations. | 4 |  | **v** | **v** |  | **v** |  |  |  |  | |  | |
|  | | BD | EC | Theory of Electromagnetic Fields | The basic concepts and laws of the electrostatic field, the basic concepts and laws of the magnetic field of direct current, the basic equations of the alternating electromagnetic field, the alternating electromagnetic field in a homogeneous and isotropic conductive medium are studied. The skills of calculating the electric field of direct current, the magnetic field of direct current, and the alternating electromagnetic field are instilled. |  | **v** | **v** |  | **v** |  |  |  |  | |  | |
|  | | BD | EC | Introduction to Specialty | The profile of the specialty, general issues of electric power and energy resources are considered. Traditional and modern ways of obtaining electrical energy, the classification of consumers of electrical energy, the main electrical equipment are studied. Practical skills of solving problems and application of graphic symbols of elements in the schemes of electric drive are acquired | 4 | **v** |  | **v** |  |  |  |  |  |  | | **v** | |
|  | | BD | EC | Fundamentals of Academic Writing | The features of scientific discourse, types of genres of academic writing, the concept and types of sub-styles in the academic text are studied. Principles of analysis of linguistic article, morphological, stylistic and lexical features of academic style are examined. Skills of analysis, editing, text editing, annotation, justification of relevance, problem formulation are taught. | **v** |  | **v** |  |  |  |  |  |  | | **v** | |
|  | | BD | HSC | Educational Practice | The practice has an introductory nature, during which the primary professional abilities and skills within the basic disciplines, familiarization with the construction of electrical equipment. Educational practice is aimed at acquiring practical skills of report writing, documentation and public defense. | 2 | **v** | **v** |  |  |  |  |  |  |  | | **v** | |
|  | | Specific Professional Deepening of the Main Objectives Module | | ChD | EC | Electrical Machines | The role and importance of electrical machines in modern engineering and power engineering are considered. The devices and principles of operation, characteristics, modes of operation and areas of application of electrical machines, the choice of electrical machines and transformers for specific conditions, processes in systems are investigated. The skills of setting up an experiment, making a diagram, teamwork, discussion and summarizing the results of the work are imparted. | 6 |  |  | **v** |  | **v** |  | **v** |  |  | |  | |
|  | | ChD | EC | Design of Electrical Machine | Types of electric energy consumers and their power supply systems are studied. Methods of calculation of consumers of electric energy and systems of their power supply are studied. Use the skills of selection, calculation, transfer of electric energy consumers of one voltage to another voltage level, skills of reading electrical connection diagrams of general industrial consumers of electricity. |  |  | **v** |  | **v** |  | **v** |  |  | |  | |
|  | | ChD | EC | Digital and Microprocessor Technology | Digital and analog signals, logic signal, combinational logic circuits, sequential logic circuits, memory elements (triggers), circuits designed with the help of triggers, the classification of analog electronic devices, principles of construction of electronic amplifiers, elements of digital circuitry, logic integrated circuits, systems based on microprocessors and microcontrollers are studied. skills to build Digital circuits and digital devices. | 5 |  | **v** | **v** | **v** |  |  |  |  |  | |  | |
|  | | ChD | EC | Industrial Electronics | Semiconductor devices, structure, volt-ampere characteristic, basic parameters of semiconductor diodes, bipolar transistor field-effect transistor, thyristor are studied. Microcircuit technique, digital, analog microcircuits, amplifying electronic devices, harmonic oscillators, digital electronics, memory devices, the purpose of analog-digital and digital-to-analog converters are analyzed. The skills of setting up an experiment, making a circuit, teamwork, discussion and summarizing the results of the work are imparted. |  | **v** | **v** | **v** |  |  |  |  |  | |  | |
|  | | BD | EC | The Power Converting Devices | The principles of construction of power electronic converter devices, rectifiers, pulse converters DC and AC voltage, inverters driven by the network, autonomous inverters, frequency converters, voltage regulators, pulse generators, specialized power sources are studied. Skills are developed, setting up an experiment, making a circuit, teamwork, discussion and summarizing the work. | 4 |  |  |  |  | **v** |  |  | **v** | **v** | |  | |
|  | | BD | EC | Electromechanical energy converters | The properties and methods of construction of electromechanical energy conversion systems, the principle of operation and design features of electric drives based on standard electromechanical energy converters, physical phenomena occurring in adjustable electromechanical converters are studied. The methods of using electromechanical converters in technological processes are studied. The skills of setting up an experiment, making a diagram, teamwork, discussion and summarizing the results of the work are developed. |  |  |  |  | **v** |  |  | **v** | **v** | |  | |
|  | | ChD | HSC | Industrial  Practice 1 | Studying the activities of the structural subdivisions and auxiliary services of the enterprise, technology, electrical engineering equipment of the energy enterprise, working design documentation of electrical engineering equipment production. Acquire practical skills in the operation of switching devices, disassembly and selection of circuits, report writing, documentation and public defense. | 4 |  |  |  | **v** |  | **v** |  | **v** |  | | **v** | |
|  | | Physical Processes of Power and Electrotechnical Devices | | BD | EC | Electric Supply for Electric Drive Systems | Electric supply systems and energy consumers are considered. Choice of circuits and voltage for in-plant еlectric supply. Electrical energy converters, elements of the mechanical part and the power channel of the electric drive, operating modes and characteristics of the electric drive with machines of direct and alternating current are studied. The skills of calculating the definition of the load, the characteristics of the electric drive with machines of direct and alternating current, and the creation of a еlectric supply circuit for the electric drive are instilled. | 4 |  |  |  | **v** | **v** |  | **v** |  |  | |  | |
|  | | BD | EC | Electric Drive of Industrial Equipment | The basic parameters of electrical networks and electrical equipment connected to them, classification and modes of operation of electrical equipment of industrial enterprises are considered. The construction, operating principles and application of electrical equipment of industrial enterprises are studied. The skills of calculating the main parameters and characteristics of electrical equipment of industrial enterprises, theoretical and experimental study, analysis, diagnosis of electrical equipment. |  |  |  | **v** | **v** |  |  | **v** |  | |  | |
|  | | BD | EC | Electrotech  -nical Materials Scienсe | The modern classification of electrical materials, electrical characteristics and processes in dielectric, conductive, semiconductor, magnetic materials are studied. The methods of selecting electrotechnical materials are studied. The skills of calculating the characteristics of electrotechnical materials, setting up experiments, making a diagram, teamwork, discussion and summarizing the work. | 5 |  | **v** | **v** |  | **v** |  |  |  |  | |  | |
|  | | BD | EC | Electrotech  -nical and Structural Materials Science | Studying the structure of matter, the basic properties of materials, the theory of solids, the structure of metals and alloys Iron-carbon system. Methods of processing electrical and structural materials are studied. The skills of calculating the characteristics of materials, setting up experiments, making a scheme, teamwork, discussion and summarizing the work. |  | **v** |  |  | **v** |  |  |  |  | |  | |
|  | | ChD | EC | Electrical and Electronic Apparatus | The construction and principle of operation of electrical devices of all voltage classes on the basis of power semiconductor devices, control of electrical devices and application of microcontrollers in electrical devices and systems of electric drive are studied. Skills in the application of methods of calculating the parameters of electrical and electronic devices are developed. | 4 |  |  | **v** | **v** |  |  |  | **v** |  | |  | |
|  | | ChD | EC | Electrical Energy Consumers and their Power Supply Systems | Types of electric energy consumers and their power supply systems are studied. The methods of calculation of consumers of electric energy and systems of their power supply are studied. Use the skills of selection, calculation, transfer of electric energy consumers of one voltage to another voltage level, skills of reading electrical connection diagrams of general industrial consumers of electricity. |  |  |  |  | **v** |  |  |  | **v** | |  | |
|  | | ChD | EC | Digital Measurement Technology | General information about analog and digital transducers, measuring instruments. Characteristics and structural diagrams of measuring instruments. Current and voltage measuring transducers. Electrical power and energy measuring instruments. Electronic analogue instruments. Recording instruments. Comparison devices. Digital measuring devices. Measurement of magnetic quantities. Measurement of non-electric values. | 5 |  |  |  | **v** |  |  |  | **v** |  | |  | |
|  | | ChD | EC | Technical measurements | The classification and methods of measurement, properties and measurement errors of measuring, electromechanical and electronic devices are studied. Ways of presenting the results of measurements, standardization of errors of measuring instruments are investigated. Use the skills of application, operation and selection of measuring instruments, calculation of errors, setting up an experiment, making a scheme, teamwork, discussion and summarizing the results of the work. |  |  |  | **v** |  |  | **v** |  |  | |  | |
|  | | Electrical Equipment Operation Module | | BD | EC | Engineering of Electric Drives and Technological Automation | General issues of designing electric drives and automation systems are studied. The modes of operation and selection of automated electric drive systems are considered. The stages of project development are analyzed. The skills of modeling and research of dynamic systems are developed using analog and digital computer technology. | 4 |  |  |  | **v** |  |  | **v** |  | **v** | |  | |
|  | | BD | EC | Reliability of electric drives and automation systems | Classification of automation systems, principles of automatic control, varieties of control systems, methods of analysis and synthesis of automation and electric drive reliability systems are studied. The reliability of the automatic control system and electric drive is analyzed. The skills of modeling and research of electric drive reliability systems and automation systems are developed. . |  |  |  |  |  | **v** | **v** |  | **v** | |  | |
|  | | BD | EC | Operation and Diagnostics of High Voltage Electrical Equipment | The classification, operating modes and main parameters of high voltage electrical equipment are studied. The main methods of diagnostics of electrical equipment of industrial enterprises are considered. The designs, principles of operation and application of high voltage electrical equipment are studied. The skills of calculating the main parameters and characteristics and diagnostics of high voltage electrical equipment are developed. | 4 |  |  |  |  |  | **v** | **v** |  | **v** | |  | |
|  | | BD | EC | Electrical Equipment Repair Technology | We study the content of repair, pre-repair tests, disassembly and defective electrical machines, disassembly and assembly, drying and impregnation of the windings of electric machines. Skills are developed in setting up the experiment, making a diagram, teamwork, discussion and summarizing the results of the work |  |  |  |  |  | **v** | **v** |  | **v** | |  | |
|  | | BD | EC | Alternative and Renewable Energy Sources | The relevance of energy saving and typical energy saving measures are studied. The methods of assessment of economic and energy resources in the production of renewable energy sources, the legal basis of economic relations in the field of electricity, regulatory and legal and regulatory and methodological framework of energy saving are studied. Skills in calculating the parameters of electrical equipment are developed. | 4 |  |  |  |  | **v** |  |  |  | **v** | | **v** | |
|  | | BD | EC | Electric and Heat Energy Storage Devices | The ecological basis of environmental protection, the structure of the ecosystem, the laws of ecology and the classification of environmental factors, the classification of types of pollution by the nature of action, the scale, sustainability are studied. Energy, its types, methods of transformation, transportation is studied. The impact of renewable energy sources on the environment Develops skills to calculate the consequences of atmospheric pollution. |  |  |  |  | **v** |  |  |  | **v** | | **v** | |
|  | | ChD | EC | Avtomatic Electrical Drive of Typical Industrial Installations | The block diagram, the mechanical part of the power channel of the electric drive and the elements of industrial robots, electromechanical connection, coordinate and phase transformations of variables, mathematical description are considered. Methods for assessing the accuracy and quality of the regulation of coordinates, the position of elements of industrial robots are analyzed. The skills of setting up an experiment, drawing up a diagram, working in a team, discussing and summarizing the work are developed | 5 |  |  |  | **v** |  |  | **v** | **v** | **v** | |  | |
|  | | ChD | EC | Electric drives and elements of industrial robots | The structural scheme, the mechanical part of the power channel of electric drive and elements of industrial robots, electromechanical coupling, coordinate and phase transformations of variables, mathematical description are considered. Methods for assessing the accuracy and quality of regulation of coordinates, position of elements of industrial robots are analyzed. Skills of setting up an experiment, making a scheme, teamwork, discussion and summarizing the results of the work are developed. |  |  |  | **v** |  |  | **v** | **v** | **v** | |  | |
|  | | Theory and Management of Electric Systems Module | | BD | EC | Automatic Control Theory | The principles of automatic control, types of control systems are considered. Methods of analysis and synthesis of automatic control systems are studied. The skills of modeling and research of dynamic systems using analog and digital computer technology, analysis of the stability of the automatic control system are taught. | 3 |  |  |  | **v** |  |  |  | **v** | **v** | |  | |
|  | | BD | EC | Automatic Control of Electric Power Facilities | The classification of automation systems, principles of automatic control, types of control systems, methods of analysis and synthesis of automatic control systems of electrical equipment are studied. The skills of modeling and research of dynamic automation systems of electrical equipment, analysis of the stability of the automatic control system of electrical equipment are taught. |  |  |  | **v** |  |  |  | **v** | **v** | |  | |
|  | | ChD | EC | Theory of Automated Electric Drive | The types of electric drives, the energy conversion in the electric drive, the statics and dynamics of the electric drive, the electromechanical properties of electric machines, the regulation of the coordinates of the electric drive, and the electromechanical transients in the electric drive are studied. The method of selecting the power of electric motors, the type of voltage and the system for regulating the speed of rotation is analyzed. The skills of calculating the static and dynamic characteristics of the electric drive are developed. | 6 |  |  |  |  | **v** |  |  |  | **v** | |  | |
|  | | ChD | EC | Adjustent coordinates of electric drive | Functional and kinematic schemes, characteristics, classification according to the nature of the movement of the electric drive are studied. The main indicators of ways to control the coordinates of the electric drive are considered. The methods of coordinates regulation in the closed structures of the electric drive are analyzed. The skills of calculating the dynamic characteristics of the electric drive are being developed. |  |  |  | **v** | **v** |  |  |  | **v** | |  | |
|  | | ChD | EC | Automated Electric Drive Control Systems | The basic requirements for systems and elements, the principles of operation of analog and digital control systems of electric drives, the interaction of the control system with other components of the electric drive are studied. The characteristics of control systems are investigated in order to optimize the technical and economic indicators of the electric drive. The skills of setting up an experiment, drawing up a scheme, working in a team, discussing and summing up the results of the work are developed. | 5 |  |  |  | **v** | **v** |  |  |  | **v** | |  | |
|  | | ChD | EC | Microprocessor devices and control systems | The classification of programmable memory chips, digital technology, principles of operation of the microprocessor, RISC processors and CISC processors, microprocessor commands, synchronous serial ports, asynchronous serial ports, principles of construction of timers, control unit and synchronization, and methods of addressing operands are studied. The skills of setting up an experiment, drawing up a scheme, working in a team, discussing and summing up the results of the work are developed. |  |  |  | **v** | **v** |  |  |  |  | |  | |
|  | | BD | EC | Use of microcontrol  -lers in the Electric Power Industry | Number systems, logic elements, structure and architecture, memory organization, command system, and microcontroller software are studied. The role of microcontrollers in electric drive control systems, block diagrams of electric drive control systems using microcontrollers are investigated. The skills of discussing the architecture of microcontrollers are developed. | 4 |  |  | **v** | **v** |  |  |  |  | **v** | |  | |
|  | | BD | EC | Data transmission systems in the electricity | The theoretical foundations of data transmission of data transformation systems, data preparation systems, the structure of the data transmission system over wired communication lines and non-wired communication lines, the speed of data transmission over various communication channels are studied. The efficiency of data transmission over various communication channels is analyzed, and the possibility of using different communication channels in data transmission in the electric power industry is evaluated. |  |  |  | **v** |  |  | **v** |  |  | | **v** | |
|  | | ChD | HSC | Industrial Practice ІI | Consolidation and deepening of theoretical knowledge in the field of the profile discipline, development of practical skills for the development of innovative technologies by strengthening the component of the educational program in terms of research and development. Practical operational skills are acquired in determining the operating modes of electro technological installations, compiling reports, maintaining documentation and public protection. | 6 |  |  |  |  |  | **v** | **v** |  | **v** | |  | |
|  | | Designing of Power Systems and Energy Saving | | BD | EC | Energy Audit and Energy Efficiency of Electric Power Systems | The basics of energy audit of electric power facilities, features of energy audit of industrial enterprises, energy saving policy in the Republic of Kazakhstan are studied. The accounting and control of electric energy, energy efficiency indicators, and the regulation of specific electric energy consumption are analyzed. Develop skills in applying methods for calculating electrical energy losses. | 4 |  |  |  | **v** |  |  | **v** |  | **v** | | **v** | |
|  | | BD | EC | Management and Marketing in Electric Power Industry | The basic concepts of economic theory, methods of technical and economic selection of the best option for the electric power network under construction or under reconstruction are studied. The current state of the countrys electric power industry and the problems of its restructuring are considered .The skills of calculation and evaluation of technical and economic indicators of electric power facilities, preparation of technical and economic documentation , business plan in the design of electric power systems are taught. |  |  |  |  |  |  | **v** | **v** | **v** | | **v** | |
|  | | ChD | EC | Modern Technologies for the Design of Electric Power Facilities | The structure and modern technologies for designing electric power facilities, a technical and economic comparison of projects, a unified system of design documentation for the design of electric power facilities are being studied. Methods for designing electric power facilities are being studied. The skills of applying the principles of designing the design of electric power facilities are instilled. | 6 |  |  |  |  |  | **v** | **v** |  |  | | **v** | |
|  | | ChD | EC | Automated-  new design of local electrical  networks | Local systems of decentralized generation and energy storage, a centralized model of energy generation and its supply, distributed generation systems, issues of regulating the demand for electricity, and energy infrastructure are being studied. The functionality of local electrical systems is analyzed. Skills are developed for the implementation of intelligent technologies in the design of electrical networks |  |  |  |  |  |  | **v** | **v** |  | | **v** | |
|  | | Module Acquisition of New Professional Competencies | | ChD | EC | Subjects on the Additional Educational Program | A set of disciplines and (or) modules and other types of educational work assigned to students for study in order to form additional competencies | 12 |  | **v** | **v** |  |  |  |  |  |  | | **v** | |
|  | | Module of Final Affestation | | ChD | HSC | Pre-degree or Industrial Practice | Practical skills of setting goals, tasks, identifying problems and ways to solve them, analyzing technical issues, and independently studying domestic and foreign periodicals on the topic of the final qualification work are taught. The skills of scientific research and analytical thinking are developed | 20 |  |  |  |  |  |  | **v** |  | **v** | | **v** | |
|  | | Module of Final Affestation | | ChD | HSC | Writing and Defence of Degree Work (Project) or Passing a Graded Exam | Description and solution of technical problems in the field of electric power, development of control schemes for systems of electric power facilities, analysis of technical solutions for the design of electric power objects, evaluate the technical and economic advantages of the adopted technical solutions, evaluate the impact of equipment on the cost of production, use applied computer programs. | **v** | **v** |  |  |  | **v** | **v** | **v** | **v** | | **v** | |

1. **SUMMARY TABLE REFLECTING THE VOLUME OF MASTERED CREDITS BROKEN DOWN THE EP MODULES**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Course of Study | Semester | The number of mastered modules | The number of studied disciplines | | | Number of KZ credits | | | | | Total hours | Total KZ credits | The number of | |
| OC | UC | EC | Theoretical training | Physical education | Educational practice | Industrial practice, pregraduate practice | Final examination | exam | Diff. pass |
| 1 | 1 | 4 | 6 |  | 1 | 28 | 2 |  |  |  | 900 | 30 | 6 | 1 |
| 2 | 5 | 3 | 4 | 1 | 26 | 2 | 2 |  |  | 900 | 30 | 5 | 3 |
| 2 | 3 | 5 | 1 | 2 | 5 | 28 | 2 |  |  |  | 900 | 30 | 6 | 2 |
| 4 | 7 | 3 | 3 | 1 | 24 | 2 |  | 4 |  | 900 | 30 | 5 | 2 |
| 3 | 5 | 5 | - | 1 | 5 | 30 |  |  |  |  | 900 | 30 | 6 | - |
| 6 | 3 | - | 1 | 4 | 24 |  |  | 6 |  | 900 | 30 | 3 | 1 |
| 4 | 7 | 5 | - | - | 5 | 20 |  |  |  |  | 600 | 20 | 5 | - |
| 8 | 3 | - | - | 4 | 20 |  |  |  |  | 600 | 20 | 4 | - |
| 9 | 1 |  | 1 | - | - |  |  | 8 | 12 | 600 | 20 | - | 1 |
| Total | |  | 13 | 12 | 26 | 200 | 8 | 2 | 18 | 12 | 7200 | 240 | 40 | 10 |

1. **STRATEGIES AND METHODS, OF TEACHING , MONITORING AND EVALUATION**

|  |  |
| --- | --- |
| **Learning strategies** | **Student-centered learning:** the learner is the center of teaching/learning and an active participant in the learning and decision-making process.  **Practice-oriented learning:** focus on the development of practical skills. |
| **Learning methods** | Conducting lectures, seminars, various types of practices with:  • application of innovative technologies:  - problem learning;  - case study;  - work in groups;  - discussions and dialogues, intellectual games, business games;  - virtual laboratory work;  - methods of reflection, projects, benchmarking;  - presentations;  • rational and creative use of information sources:  - multimedia training programs;  - electronic textbooks;  - video lectures, video films;  - digital resources.  Organization of independent student work, individual consultations. |
| **Monitoring and assessing the achievability of learning outcomes** | **Current control** on each topic of a discipline, control of knowledge in in-classand out-of-class activities (according to a syllabus). Assessment forms:  • questioning in the classroom;  • testing on the topics;  •test;  • defending student independent works;  • virtual laboratory work;  • discussions;  • trainings;  • colloquia;  • essays, etc.  **Midterm control:**at least two times during one academic period within each academic discipline.  **Intermediate attestation**is carried out in accordance with the working curriculum, academic calendar.  Conduct forms:  • exam in the form of testing;  •oral exam;  •written exam;  • combined exam;  • defense of term works/projects;  • defense of practice reports.  **Final state attestation:** defense of a thesis or passing a comprehensive exam. |

**7 EDUCATIONAL AND RESOURCE SUPPORT OF THE EDUCATION PROGRAM**

|  |  |
| --- | --- |
| **Educational Information Center** | The structure of the Educational Information Center includes 6 subscriptions, 16 reading rooms, 2 electronic resource centers (ERC). The basis of the network infrastructure of the Educational and Information Center is 180 computers with Internet access, 110 workstations, 6 interactive whiteboards, 2 video doubles, 1 video conferencing system, 3 A-4 format scanners, JIC software - AIBS «IRBIS-64" under MS Windows (basic set of 6 modules), stand-alone server for uninterrupted operation in the IRBIS system.  The library fund is reflected in the electronic catalog available to users on the site http://lib.ukgu.kz on-line 24 hours 7 days a week.  Thematic databases of their own generation: «Almamater», «Proceedings of SKSU scientists», «Electronic archive» have been created. Online access from any device 24/7 via the external link <http://articles.ukgu.kz/ru/pps>.  Catalogs are processed electronically. EC consists of 9 databases: «Books», «Articles», «Periodicals», «Proceedings of the teaching staff of SKSU», «Rare Books», «Electronic Fund», «SKGU in Print», «Readers» and «SKU».  The EIC provides its users with 3 options for accessing its own electronic information resources: from the «Electronic Catalog» terminals in the catalog hall and in the EIC subdivisions; through the information network of the university for faculties and departments; remotely on the library websit.  Open access to international and republican resources: «SpringerLink», «Polpred», «Web of Science», «EBSCO», «Epigraph», to electronic versions of scientific journals in the public domain, «Zan», «RMEB», «Adebiet», Digital library «Aknurpress», «Smart-kіtаr», «Kitаr.кz», etc.  For people with special needs and disabilities, the library website has been adapted to the work of visually impaired users |
| **Material and technical base** | For the implementation of educational activities, the Educational Program «6B07150-Electric Power Engineering» is equipped with the following material and technical base:  1. Virtual laboratory "Electrical engineering and electronics  2.Laboratory of electrical machines and electric drive:  - «Electric cars»;  - «Electric drive and automation» (standard set «Converting equipment», standard set «Automated electric drive», stand-simulator «Automation using SMART system»;  3. Laboratory «Renewable Energy»;  4. Stand - simulator «Power supply of industrial enterprises»;  -Laboratory «Electrical circuits and fundamentals of electronics»:  -Typical set of educational equipment «Electrotechnical materials»;  5.Laboratory complex «Information - measuring equipment»  6.Laboratory of power supply of industrial enterprises:  -Typical set «Power supply of industrial enterprises»  - Training and practical range  - Laboratory №. 504g is equipped with an interactive whiteboard.  - The educational-scientific-practical complex is organized in LLP «Electroapparat Plant»;  - A branch of the department is organized in LLP «Аѕіа Тrafo»; |

**AGREEMENT LIST**

on educational « 6В07150-Electroenergetics»

Director of AID\_\_\_\_\_\_\_\_\_\_\_\_\_\_Naukenova A.S.

Director of ASD \_\_\_\_\_\_\_\_\_\_\_\_\_ Nazarbek U.

Head of DNPiK \_\_\_\_\_\_\_\_\_\_\_\_\_ Parmankulova P.J.

