

GENERAL TRAINING CYCLE

Compulsory components

Safety in Electrical Installations. Safety measures in normal and emergency modes of electrical installations. Safety during installation, repair and maintenance of electrical installations. Lightning protection of agricultural objects.

Electromagnetic Compatibility. Power quality. Quality of energy and its determination. Ensuring of sustainable functioning of normal power supply for any violations of modes. Transients in stations synchronous generator and electrical systems networks. Electromechanical transients in electrical systems for small and large disturbances.

Information Technology. Information and controlling complexes and systems. Concept of automated electricity metering systems in terms of energy market in Ukraine. The structures and features of the construction and information control systems and systems for electricity metering.

Agrarian policy. The discipline introduces the principles of formation of policy in agrarian sphere, gives the possibility to gain proficiency in methodical and methodological principles of the development and realization of the complex of actions concerning support and provision of the development of agriculture in the system of inter-branch links in national economy as well as estimate from the theoretic position practical actions of state structures concerning regulation of the agricultural production of the country. Both national and foreign experience is studied. In case of mastering the material students get the possibility to form their own view on professional base about processes and phenomena happening in agrarian sector of the state economy.

Business foreign language. The general aim of the program of teaching of foreign language for the professional purpose is formation students' professional linguistic competencies that will contribute to their efficient operating in cultural variety of training and professional environment. The methods of search of new information in another language sources, linguistic methods of analytical study of another language sources are learned. Students study published original literature in another language and increase their lexical and grammatical skills. Methods and linguistic peculiarities of annotation and synopsis of another language sources, the principles of translation of professional oriented another language sources are studied.

Methodology and organization of research with the principles of intellectual property. The aim of the discipline is formation of the system of knowledge in methodology, theory of method and research process, methodical support of scientific and research activity at the stages of preparation of a Master paper, formation of the ability to organize research of a specific issue using the whole complex of the traditional methods of research including general and special methods. The main task of the theoretical part of the course is introduction to students the current concepts of research creation, the principles of methodology of scientific perception and methods of research. The main task of the practical part is the development of self-education ability, mastering skills of formation and application of perceived methodological position of research. In case of mastering the course students have to improve their skills of search, assortment and processing of scientific information, accurate formulation of a problem, aim, task, object, subject, methods of research. Introduction to students the principles of intellectual property and direction of them to gain knowledge and skills concerning registration of rights of ownership, their protection, commercialization, estimation and management are envisaged.

SPECIAL (PROFESSIONAL)

TRAINING CYCLE Compulsory components

Energy Supply. External electrical networks, substations and rural power reserve. The equipment for power stations and substations. Relay protection and automation. Reliability of power supply. The quality of electricity.

Energy Security. Main provisions national energy security. Diversification of energy supply. Planning, organization and management of the power plants and industrial energy management. The main directions of formation of tariffs in the market. System Planning and preventive maintenance of equipment. Control power consumption. The energy balance. Rationing of fuel and energy resources. Energy consumption monitoring system. Energy-saving measures.

Mathematical Modeling of Electrotechnical Systems and Their Components. Parameters of energy networks. Modeling of systems and networks parameters. Requirements for the performance of systems and networks, ways to support them. Criteria for optimizing network settings. How to optimize the network settings. Analysis of modes of power systems. Criteria for optimization of networks. Optimizing components of the cost of electricity.

Methods of Synthesis and Analysis of ACS. Intelligent systems. Tool environment intelligent systems. Technological means intelligent systems. Subsystem Automation programming tools and intelligent. The intelligent programming. Automation Programming Environment – TURBO. Systems EXSYS, GURU – ART. Hardware implementation of intelligent systems, element base. Examples of artificial intelligence.

Basics of Energy Saving. The main factors of energy savings in the industry. General questions determining the economic efficiency of capital investments in the energy sector. Fundamentals of electricity rationing. The main directions of energy saving various industries. Power saving modes in power systems industry.

Design of Electrification, Automation and Energy Supply Systems. Methodology Electrification system design, automation and energy agriculture. Computer technologies in design. Requirements for projects.

Optimization Theory. Fundamentals of linear and nonlinear mathematical programming. Mathematical models. Transport problem. Fundamentals of dynamic programming. Optimization models.

Heat and Water Supply in Agriculture. Heat power installations and heating system. Energy audit and management. Energy Efficiency of heat APC. Sources of water. Facilities for the abstraction of surface and groundwater. Distributors and internal water network.

Technology of Maintenance and Repair of Electrical Equipment and Means of Automation. Operation of transformer substations, switchgears, transmission lines, electric, lighting and Irradiation plants and electrically heated electric equipment, means of communication. The procedure for putting into operation mounted systems. Formation and Organization of instrumentation and automation tools. Operation of boilers, heat generators and heaters. The operation of power equipment.

Educational and professional program of master's training

Optional components of EPP

Optional Block by specialty

Optional Block 1 "Automation of technological processes and computer integrated systems to control information and technological resources in agriculture"

Methods of Modern Process and Production Control in Energetics. Characteristics of technological processes as control facilities and their disturbances. Principles of automated process control systems. Automation of technological processes in energetics. Principles of the control system design. Information channels and their characteristics. Identification of control objects. Control algorithms. Technical means of automation. Reliability and economic efficiency of automation.

Automated Systems in Energetics. Principles of the control systems design. Information channels and their characteristics. Identification of control objects. Control

algorithms. Technical means of automation. Reliability and economic efficiency of automation.

Typical Technological Processes in Energetics and Methods of Modeling. Automation object; classification, structure and main characteristics of typical technological facilities, technologies and processes AIC branches. Physics and chemical basis of hydrodynamic, thermal, mass transfer, mechanical, chemical and technological processes. Calculation of the heat and mass transfer processes in agriculture technology processing and storage of agricultural products. Fundamentals of modeling and designing technological devices.

Hardware and hardware of control systems in power engineering. Principles of construction of ASUTP. Information channels and their characteristics. Identification of management objects. Management algorithms. Technical means of ACUTP. Reliability and cost-effectiveness of ACMS. Microprocessor and microcomputer architecture, microprocessor programming in assembler language, microprocessor hardware. Development and adjustment of microprocessor systems in agricultural production. Discrete signals, their encoding. DAC and ADC. Time and frequency domain analysis. Manageability and observability. Synthesis of digital systems. Limitations in microprocessor control systems.

Optional Block 2 "Electrical networks and systems"

Automatics and Telemechanics of Energy Supply Systems. Information management systems power supply. Means remotely control power supply systems. Telecontrol systems, telemeasuring and signaling. Channels of communication systems in automation and remote control. Dispatch of command and control equipment. Means of automation in the control systems of power supply. Techno-economic performance and automation telemechanization.

Electrical Networks and Systems. The electric part of substations and reserve power. Protection of rural electrical surge. Increasing economic efficiency and reliability of power supply systems of agriculture. Automation and control systems.

Electrical Plants and Systems of Energy Supply. The electric part of substations and reserve power. Protecting rural of electrical surge. Improving the efficiency and reliability of power supply systems of agriculture. Automation and control systems

Design of Power Supply Systems in Agriculture. Setting the specification, calculations, graphics creation and delivery of documents using CAD company Autodesk Ins. And subsystems CAD MathCad, AUTOCAD, and the best computer-integrated technologies. The mathematical description of the functioning ACS. Typical dynamic link ACS. Identification of facilities management models

Optional Block 3 "Energy supply"

Energy Saving in Heating Technologies. Sources of heat and electricity. Losses in the transmission of energy. Losses in transformers. Losses in transmission lines. Technical measures to reduce energy losses. Arrangements reduce energy losses

Accounting and Control of Energy Resources Distribution and Costs. Devices of accounting of active and reactive power. Regulators of reactive power. Multiplemetering. Devices for control of heat consumption. Counters of water and gas.

Thermal Power Plants and Systems. Sources of heat. Burning fossil fuels. Boiler systems. Heat. Heating system. Thermal network. Gas agriculture. Alternative heating sources of agricultural production.

Heating Technologies of Production and Processing of Agricultural Product. Sources of heat. Burning fossil fuels. Boiler systems. Heat. Heating systems. Thermal net

Optional Block 4 "Scientific and technical principles of electromechanical energy conversion"

Reliability of Technical Systems, Technogenic Risks. The main categories and standards in reliability. Categories reliability of electricity supply. The quality of

electricity. Man-made risks in the energy sector. Environmental aspects electrification of agriculture.

Accounting and Regulation of Energy Resources Costs. Devices of accounting of active and reactive power. Regulators of reactive power. Multiple-metering. Devices for control of heat consumption. Counters of water and gas.

Technical Service of Energy Equipment. Maintenance of transformer substations and power lines. Servicing of electrical consumers. Diagnosis of electrical equipment.

Physical Research Software. Computer technologies for visualization of modes and parameters of technological objects and production processes. Application packages for processing and transmitting information. Technical means of information technologies. Global Internet.

Optional Block 5 "Electrotechnical systems of power consumption"

Renewable Sources of Electric Energy Generation. Renewable sources of energy. The types of small plants. Features of small power plants and their role in the power supply of AIC. Comparative characteristics of small sources of electricity. The construction of small power plants.

Design of Power Consumption Systems. Setting the specification, calculations, graphics creation and delivery of documents using CAD company Autodesk Ins. And subsystems CAD Mathcad, Autocad, and the best computer-integrated technologies. The mathematical description of the functioning ACS. Typical dynamic link ACS. Identification of facilities management models.

Relay Protection and Automation of Distribution Power Networks. Theory and practice of automatic control modes of power supply systems using modern methods and means of automation and relay protection.

Telemechanics and ACS of Power Supply Systems. Theory of telemechanical signal transmission by channels of communication. Methods of improving noise immunity of signals. Principles of telecontrol, signaling, remote metering. Features of modern telemechanics, automatic supervisory control of power networks and power supply of industrial enterprises.

Optional Block 6 "Electrotechnics and electrotechnology"

Agricultural Technology Electrotechnology. Basics of converting electrical energy into thermal energy. Calculation of electric heating installations. Direct, indirect, arc, induction, dielectric, thermoelectric heating. Fundamentals of using optical radiation in agricultural production. Lighting and irradiation installations appointment. Electric heating installations appointment. Possibilities of using new electrotechnical techniques in agricultural production.

Modeling of Adjustable Electric Drives, Aggregates and Production Lines. Classification of models of induction motor (IM). Mathematical model of IM, powered by ideal voltage source. Consideration of the asymmetry of the electromagnetic system IM. The mathematical model of the IM, which is powered by the ideal source of alternating current. Conversion coordinates. Matrix Simulink-models of an asynchronous motor in an arbitrary orthogonal coordinate system. Models of IM in a two-phase stationary coordinate system of a stator. Mathematical models of an asynchronous motor in an orthogonal coordinate system, oriented on the vector of the flow of a rotor works. Gas supply of agriculture. Alternative heating sources of agricultural production

Fundamentals of energy efficiency of consumer grids. The energy problem, its roots and approaches to solving it. General characteristics of the fuel and energy complex of Ukraine. Ensuring the energy security of the state. Energy Saving Potential in Ukraine. Energy Saving Legislation. Characteristic problems in the field of energy supply. Introduction of the latest technologies as a method of energy saving. Application of automatic energy management systems as a method of energy saving. Introduction of alternative energy sources as a method of energy saving. Energy-saving technologies

in industry. Energy saving in agrarian and industrial complex.

Fundamentals of bioenergy technologies. Renewable resources for energy-generating bioenergy. Obtaining biomass of multi-enzyme systems for the conversion of chemical and light energy into renewable energy. Technologies for producing solid fuel from biomass (from green biomass, peat, coal and waste). Thermal methods, equipment and technologies for the production of energy from solid biomass and waste. Biofuels and prospects for their use. Biologics for intensification of bioenergy processes. Safety when operating this category of technology. Fuel Standards. Peculiarities of use of gas and liquid biofuels in power plants and their impact on them.

Optional Block 7 "Lighting engineering and light sources"

Laser Technics. Physical bases of quantum electronics. Physical bases of lasers. Active laser environments. Excitation systems in different types of lasers. Optical resonators. Properties of laser radiation. Optical amplifiers. Acquaintance with the physical foundations of quantum radiophysics and nonlinear optics and the most important characteristics of the corresponding devices.

Design, Installation and Operation of Lighting Installations. Organization and methodology of design work. The stage of working design. Requirements for electrical part of lighting installations. Electricity supply of lighting installations. Power supply circuits. Calculation of the lighting network. Compensation of reactive power. Protection of lighting networks. Types of postings and areas of their use. Grounding and Grounding in Lighting Networks. Installation of wiring and lighting fixtures. Operation and maintenance of lighting installations.

Lighting Installations and Systems. Normative and lighting calculations of lighting installations (LI). Principles, criteria and methods of valuation. Threshold characteristics of the visual process and methods of their study. The calculation of the spectral composition of radiation during the normalization of lighting installations. Choosing a normalized photometric characteristic. Standardization of quantitative and qualitative characteristics of lighting. Methods of calculating the quantitative indicators of the LI. Methods of calculation of qualitative indices of LI. Methods of calculation of power LI. Lighting software design and calculations of LI.

Physical Bases of Light Sources and Energy Saving in Lighting Installations. Physical processes in thermal, semiconductor (LED), gas-discharge light sources. Physical principles of light generation. Thermal radiation. Laws of thermal radiation. Zone theory of solids. Basic provisions of quantum mechanics. Luminescence and gas discharge Problems and prospects for increasing the efficiency of electricity use in lighting installations. Technological process of irradiation. The general principles of its energy assessment. Power analysis of power supply to the source of radiation, generation of flow in the source, flow formation of the reflector.

Optional Block 8 "Energy audit"

Design solutions for energy management. Design solutions for the arrangement of microclimate systems for construction and engineering structures. Dynamics of energy tariffs. Key energy efficiency measures. Energy efficiency in the field of production, transmission and consumption of electric and thermal energy. Criteria and practical methods for determining energy efficiency. Main directions of energy saving. World experience, achievements and strategic guidelines for energy efficiency policy.

Accounting and management of energy consumption. Regulatory and legislative principles of energy accounting. Devices of providing of the account of energy carriers. Initial processing and analysis of information received. Automated commercial energy metering systems. Automated energy management systems. Instrumental surveys. Measurement of energy and resource costs.

Energy audit and management in agribusiness. Primary energy audit. Instrumental survey of buildings and engineering structures. Collection and analysis of energy source information. The main indicators of the energy passport. Energy balance

of the enterprise. Methods of obtaining energy balances and energy characteristics of aggregates.

Energy management and project management. Energy certification of buildings. Physical and financial-economic methods of energy efficiency analysis. Classification of buildings by specific energy consumption indicators. Regulatory requirements for energy efficiency of buildings. State and development of technical and economic solutions for thermal protection of buildings and engineering structures. Rationale and choice of technical solutions for thermo-modernization. International financial and economic assistance programs and projects and mechanisms for their implementation.