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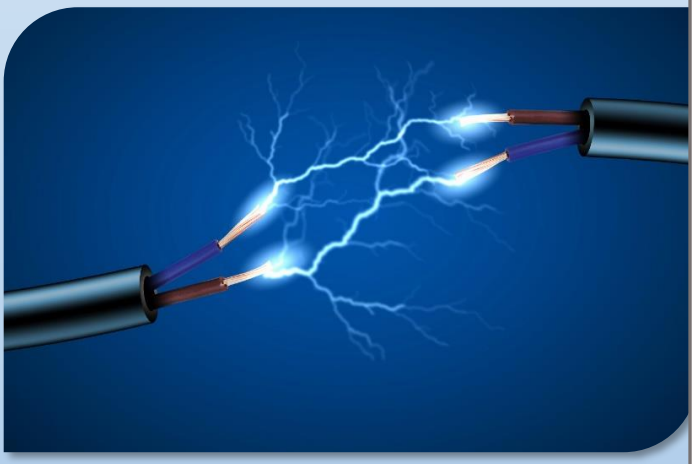

INFORMATION PACKAGE

FACULTY OF ELECTRIC POWER ENGINEERING AND AUTOMATICS

Kyiv, 2016

CONTENT

*** *The information is current as for 2015/2016 academic year. In the next academic year, there may be minor changes in the list of training directions, specialties, and specializations.*

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1. COMMON DESCRIPTION AND THE STRUCTURE OF FACULTY

Faculty of Electric Power Engineering and Automatics (FEPEA) begins with the creation of Laboratory of Electrical Engineering and contemporary a scientific school for electrical engineering of professors' Artemiev M. A. and Sokolov A A. back in the early days of the Kyiv Polytechnic Institute.

Today, **the Faculty trains professionals in specialty 141 "Electric Power Industry, Electrical Engineering and Electromechanics"** for the modern technologically advanced electric power industry and electrical engineering, who are capable to develop, design and operate modern electric power and electromechanical systems, manage the process of electric power enterprises and their automation based on widespread use of information and computer systems.

The curricula of all specialties of the Faculty provide deep fundamental training in physics, mathematics and humanitarian disciplines, a high theoretical and practical training in the specialty with the extensive use of modern computer technology. Students of the faculty have the opportunity, in addition to the basic selected education, get a second (parity) education on a contractual basis. Faculty also trains specialists on individual programs, and conducts post-graduate and doctoral training, skill upgrading.

Structure of the Faculty

The Faculty consists of 8 departments

1. Department of Electromechanics trains experts with a degree in "Electrical Machines and Devices." This is the first in Ukraine department of the electrical profile. 95 years of Department activity in the sphere of higher education determines its priorities:

EXPERIENCE – TRADITIONS – EDUCATION QUALITY – RECOGNITION.

If you choose specialty "Electrical Machines and Devices", you will be a specialist in:

- the development and operation of electromechanical complexes for power generating systems, systems of energy transmission and consumption;
- the design, manufacturing, and operation of electrical machines and devices for general and special purpose;
- research, design, and implementation of modern electromechanical and electro mechatronic systems;
- the use of modern computer-aided design (CAD), including 3D-design, in the analysis and synthesis of various electromechanical and electronic devices.

Enterprises in such sectors as energy, transport, household appliances, robotics, medicine and the like are interested in our specialists.

2. Department of Electric Power Plants trains experts with a degree in "Electric Power Plants".

"Electric Power Plants" is an educational program aimed at training of professionals in the organization and carrying out of maintenance, operation, repair, adjustment and testing of electric equipment of thermal, nuclear and hydraulic electric power plants.

The graduates receive fundamental, technical and technological training, much attention is paid to the training of future specialists in computer and modern power plants control systems.

Thorough and comprehensive training enables them to work productively in many divisions of the electroenergetics: power plants, institutions of electric power systems, distribution networks and supply systems of industrial enterprises, scientific - research and design institutions of the sphere of electroenergetics.

3. Department of Power Systems Automation is one of the leading in Ukraine departments that trains experts with a degree in "Systems of Production Management and Distribution of Electricity."

Specialization "Systems of Production Management and Distribution of Electricity" is one of modern educational and professional programs, according which specialists are trained for the solution of modern scientific and technical and production problems of the electric power industry, including control of the complicated electric power systems with the use of modern

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methods and means of monitoring, protection, automation, information support, production management and distribution of electricity.

Students of the department get the fundamental theoretical and practical knowledge, professional-oriented skills to solve complex problems of the electric power industry, based on the study of modern technologies, practical work in laboratories equipped with modern electrical apparatus, microprocessor technology of protection and automation, information and control systems and complexes for automatic and automated control from leading domestic and foreign companies and institutions.

The training program makes it possible to obtain a double diploma, offers great opportunities to graduates for employment and successful work in domestic and international power companies, institutions, firms, and in the other industries.

4. Department of Automation of Electromechanical Systems and Electric Drive

trains experts with a degree in "Electromechanical Systems of Automation and Electric Drive" - one of the most competitive specializations among all technical universities of Ukraine.

The broad scope of use of modern electromechanical automation systems and electric drives, which are the components of industrial equipment, robots, electric vehicles, objects of municipal engineering, household appliances, determines the need for a thorough training in the field of electric drive theory, control theory, microprocessor technology, electronics, process automation, computer modeling, software development for computer control and automation systems in modern programming languages.

The department is proud of its graduates, among which are: The President of the National Academy of Sciences of Ukraine, academician Paton B. E; Professor of the University of Rochester Lyashevskiy S. (New York, USA); Professor Bozhko S. – Chief scientific manager of research programs of the University of Nottingham, UK; Dr. Markov H. - deputy of two convocations of the European Parliament; Ruban V. – employee of the National Aerospace Agency (NASA), USA; Tusita A. – head of division of the global wind generators manufacturer «Vestas», Denmark, and many others.

Graduates have a wide profile of training, are working in all areas of human activity as an electrical engineer (electromechanicians, electronics, programmers, designers) in enterprises, design organizations, as well as engineers and researchers in scientific organizations engaged in development and research of electromechanical automation systems and electric drives.

5. Department of Electrical Networks and Systems trains experts with a degree in "Electrical Systems and Networks".

The department provides training, forming a knowledge base, based on the vision of a new generation of distribution networks in the near future as a fully automatic «Smart Grids», which should provide a parallel flow of electricity and information from the power plant to the consumer, including all intermediate points. As the smart grid should combine complex control and monitoring tools, information technology and communication tools, each a specialist in the maintenance of electrical installations must be skilled in computer equipment, information and communication technology, programming and technological elements of electrical power networks.

Graduates of department obtain all the necessary knowledge to work in the field of analysis, planning, management and optimization of energy systems, the use of modern computer technology in the field of electric power transmission and distribution in electric networks of various classes of rated voltage, increasing survivability of combined electrical systems in emergency situations, computer support of manager decision on the base of expert systems with elements of artificial intelligence.

6. Department of High-Voltage Technics and ElectroPhysics trains experts with a degree in "Technology and ElectroPhysics of High Voltages."

Today, in the world of rapid development of new technologies and the increase in transmission capacities of the power systems, the main task of the department is to train graduates capable of designing and ensuring reliable operation of the high-voltage electrical equipment, diagnostics of high-voltage insulation, protection against overvoltage and lightning injuries.

A feature of the specialization is the train of students through the use of IT technologies and simulation of electrophysical processes, which ensures the relevance of specialists at all stages of production, transmission and distribution of electricity in the areas of air and space technology, as well as in the development of various electro-technological complexes and systems.

In the view of the department are electrical and magnetic fields of power objects and their impact on the environment, isolation of overhead and cable transmission lines, insulation of equipment of stations and substations, as well as the protection of power facilities against overvoltage and lightning. Since 2000, the Department is the main agency of Ukraine on the use of non-linear surge arresters in networks of high voltage.

In teaching students on specialization "Technology and Electrophysics of High Voltages", special attention is paid to the marketing of high-voltage electrical equipment.

7. Department of the Renewable Energy Sources train experts with a degree in "Alternative and Renewable Energy Sources."

During the period of study, students obtain:

- ability to design, construct, deploy into production, construct and operate power plants that use renewable energy sources for power supply of industrial, municipal and domestic, agricultural buildings and private homes or facilities;
- skills of scientific and research work on the creation of new types of heat and power generating equipment using renewable energy sources;
- advanced computer, technical and technological training to work at the power plants using renewable energy sources, as well as at traditional electric power facilities; the ability to use modern information technology to manage power facilities using renewable and conventional energy sources;
- skills in management, marketing, and auditing in market conditions of electric power facilities and power plants using renewable and conventional energy sources.

8. Department of Theoretical Electronics is one of the largest and oldest units of the Igor Sikorsky KPI, that carry out basic and vocational-oriented electrical training of specialists. In addition to traditional courses in the department, "Theoretical Foundations of Electrical Engineering", "Electronics", "The Theory of Electric and Magnetic Circuits" were designed and supported methodically courses "Mathematical Problems of Energetics" and "High Voltage Direct Current Energy Transmission."

High-quality practical training of students is carried out in eight laboratories of the Department. Students are taught electrical engineering and electronics on effective methods with the use of modern didactic teaching materials, including teaching materials of distance learning system "Electrical Equipment".

Students enthusiasts under the guidance of leading teachers of the department deepen their knowledge and improve practical skills in student clubs on the electrical engineering.

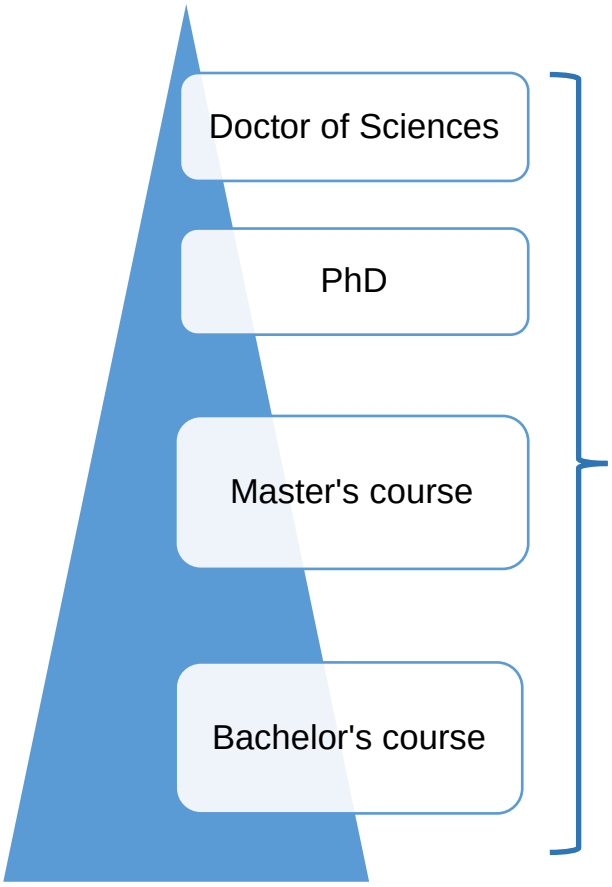
Olympiads on theoretical foundations of electrical engineering held regularly with the participations of students both from the Igor Sikorsky KPI and from the other universities of Kyiv and All Ukraine.

2. EDUCATIONAL PROGRAMS

Levels of higher education. Training of students at the IASA is carried out at several levels of higher education. The first (Bachelor's, I-IV academic years) – the students acquire knowledge in physics, mathematics, mechanics, computing, informatics, and special disciplines. During the IV year, they defend bachelor course work and receive qualification degree Bachelor. At the second level (Magistracy, V - VI academic years) training is carried out according to the Master's program. Students are trained and acquire relevant skills including laboratory practice. Additionally, students have the opportunity to continue their education in a graduate course, and then in a doctoral candidacy of the University.

Terms of specialists training: Bachelor (b) – 4 years; Master (m) – 2 years (standard terms of training in Bachelor's course and Magistracy), Graduate course / Doctoral candidacy lasts 3 years (4 years by the correspondence study).

Specialties and specializations of the specialists' training:



- Electrical Systems and Networks
- Electric Power Plants
- Systems of Production Management and Distribution of Electricity
- Alternative and Renewable Energy Sources
- Electrical Machines and Devices
- Electromechanical Systems of Automation and Electric Drive
- Technology and Electrophysics of High Voltages

FEPEA graduates work on the positions of heads and leading specialists of structural units of power supply companies and power systems, research and design organizations, electrical industrial institutions of various forms of ownership in Ukraine and abroad. The best graduates can continue their education in graduate school to obtain a scientific degree.

3. TRAINING AND LABORATORY BASE

The laboratory base of faculty:

- Scientific and Engineering Center "Informset"
- Schneider Electric Center
- ABB Center

Training on the course "Fundamentals and communication tools in the power industry" are carried out in the **Laboratory SCADA** and in the **ABB Center** of remote control systems. Both the outdated equipment, which is still used in electric power systems, as well as advanced equipment from the world famous companies, are used for laboratory work.

The laboratory is equipped with the:

- devices to perform channel simulation of a telephone dial and surveys its characteristics under various operating conditions;
- apparatus for the construction of high-frequency data transmission channels for high-voltage power lines;
- terminals of relay protection and telemechanics from company ABB (in particular relay terminals REF615, RET615, REC650 and RTU560 remotely controlled device), which are considered as part of an integrated substation control system.

Industry research laboratories:

Laboratory of Relay Protection and Automation Devices is equipped with the relay protection and automation on the traditional element base: microelectronic and electromechanical (1st cycle of works) and modern microprocessor protection and automation terminals (2nd cycle of works). Moreover, the variety of MPD, which is equipped a laboratory, covers almost all foreign (ABB, Siemens, Alstom, Schneider Electric) and domestic manufacturers (PA Kyivprilad, ENERGOMASHVIN). Also, modern simulators and emergency modes RETOM and Doble are used in the laboratory.

Laboratory of Relay Protection and Automation ABB is equipped with the modern microprocessor relay protection terminals and automation terminals from the company ABB (Sweden).

Analog and digital devices, measuring current and voltage transformers, bridges and compensators, inductive and digital multi-function power meters, etc. are used in the **Laboratory of Electrical Measurements**.

At the **Training/research Laboratory "Computer Class"** students learn to program and obtain the skills of their chosen profession. The software is constantly updated; new laboratory research works are developed.

4. RESEARCH ACTIVITY

Faculty research activities are focused in three main areas:

- ***fundamental research on the most important problems of natural, social and humanitarian sciences;***
- ***the latest technology and resource-saving technologies in the energy production;***
- ***new computer tools and technologies of the information society.***

Department of Electric Power Plants developed**:**

- complex mathematical model of a power plant with a nuclear reactor;
- the method of assessing the most likely perturbations depending on the state of the system components;
- a method for the analysis of electromagnetic transients on the basis of the mathematical description of the system in the form of changes in the state;
- a numerical-analytical method for the study of the periodic motion of the system for the analysis of asynchronous modes of power systems.

Areas of scientific research:

- complex modeling and research of crash conditions at the plant and the dynamic regimes in power systems containing nuclear power plants in the structure of generation capacity;
- development of the theory, methods and mathematical models of risk analysis of the operation of power plants with the system's own needs;
- modeling and management regimes of power systems using modern information technologies;
- theory, methods and algorithms for evaluation of the technical condition of electrical equipment on the basis of achievements in the field of artificial intelligence.

Scientific research, that are carried out at the **Department of Power Systems Automation**, held in areas that are closely related to the scientific school of the department "Theoretical fundamentals, methods and tools for the control of electric power systems" (approved by the order of the Ministry of Education and Science, Youth and Sports of Ukraine 07.06. 2011 № 535), including a priority for today:

- Research to improve the efficiency and reliability of electric power systems based on simulation proceeding in their transition processes and the development of advanced methods and tools for the control of production and distribution of electricity.
- Scientific and technical aspects of the research, design, operation of power plants, networks, and systems. Improving the quality of the functioning of the automatic control system of frequency and power of the integrated power system of Ukraine.
- Development and implementation of an automated system of gathering information on microprocessors designed for automated data collection and transmission to the upper levels of the discrete and analog data of normal and emergency operating modes of power generation facility and relay protection and automation devices.
- Development of the theory of modeling, analysis and synthesis of control systems, the development of new approaches and methods of construction and the creation of tools, providing more efficient operation of electric power systems.
- Development of methods for determining and calculating the power loss for reactive energy.

Among the major scientific and technological achievements of the department can be underlined the implementation of automated information gathering system "Argon" from microprocessor devices in normal and emergency modes (implemented in more than 35 objects of "Ukrenergo"). Scientific and practical advice on improving the quality of functioning of the system of automatic control of frequency and power of the united energy system of Ukraine (are used by NEC "Ukrenergo"). The implementation of the developed method of determining and calculating the power loss for reactive energy (approved by the Ministry of Energy).

According to the results of scientific activity scientific members of the department have participated and won in competitions programs and grants, including foreign. Also there were obtained a number of awards: The State Prize in Science and Technology, V. M. Khrushchev Award of the National Academy of Sciences of Ukraine, the Ukrainian National Academy of Sciences Award for Young Scientists.

Areas of scientific interests of the **Department of Automation of Electromechanical Systems and Electric Drive**:

- systems for vector control of asynchronous engines;
- systems for vector control with maximizing the time/current ratio;
- electromechanical systems based on dual power machinery;
- identification of induction motor parameters;
- active rectifier control;
- parallel active filter control;
- unified controllers and the sphere of their application.

Department of Electrical Networks and Systems carry out research in the following fields:

- modern intelligent tools for analysis, optimization, and control of operating modes of electrical and power systems;
- increasing the operational reliability of the electrical power network equipment;
- implementation of a new model of Ukraine's electric energy market.

Department of High-Voltage Technics and ElectroPhysics performs research and development work at the request of companies and organizations. Only in recent years, the department has developed a number of modern high-voltage electrical equipment:

- Secondary (mobile) standard of Ukraine 110 kW class;
- Precision reference voltage transformer VT-6/10;
- Test voltage transformer VTN-180;
- High voltage meter VVN-0,8-100 M;
- High-voltage divider ODN-75;
- Mobile standard - voltage transformer ETH-110;
- Mobile calibration laboratory of 0.22 ... 110 kW voltage classes.

5. INTERNATIONAL PROJECTS AND COLLABORATION

FEPEA, as one of the largest faculties of the Igor Sikorsky KPI, has widespread international relations. This is, above all, cooperation agreements with the University of Puebla (Mexico), the University of Birmingham (UK), University of Munich and Ilmenau University of Technology (Germany), University of Rome, Otto von Guericke University (Magdeburg, Germany), the Brno University of Technology (Czech Republic), "Siemens", Lodz University of Technology (Poland), North China Electric Power University and Harbin Institute of Technology (China), Ho Chi Minh City University of Technology (Vietnam). Exchanges of experts, training abroad of students, and academic staff of FEPEA is carried out in the frameworks of these contracts.

The scientific activity of FEPEA has received public recognition in Ukraine and internationally. Among the staff of the Faculty are nine winners of the State awards, eight academicians of National Academy of Sciences of Ukraine, the New York and European Academies of Sciences. The National Training Center of Energy Managers was created in 1996 on the basis of the department with the help of the European Communities (according to the TACIS program) for the purpose of training specialists in energy supply and improve energy efficiency in Ukraine. Room of the Center is equipped with the modern energy-saving devices and equipment, operating demonstration and training models and the like.

6. CONTACT INFORMATION

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