

«...global economy requires
high-quality and efficient
energy management,
awareness of the need



INFORMATION PACKAGE

TRAINING AND SCIENTIFIC INSTITUTE OF ENERGY SAVING AND ENERGY MANAGEMENT

Kyiv, 2021

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***** Information is current as for the 2021/2022 academic year. In the next academic year, there may be minor changes in the list of training specialties and educational programs.**



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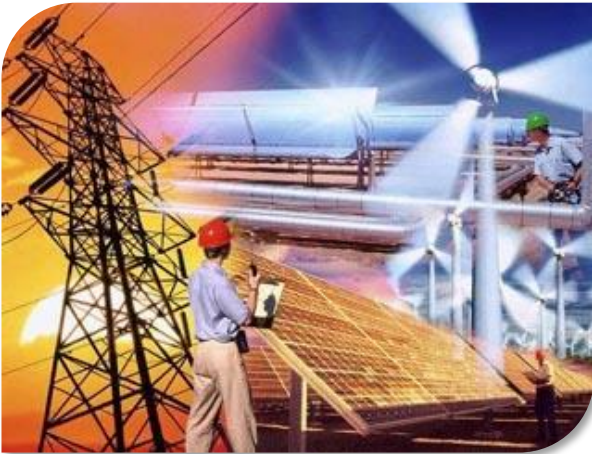
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1. COMMON DESCRIPTION OF THE INSTITUTE

The modern global economy requires high-quality and efficient energy management,



awareness of the need for efficient use of energy. For this very reason, the **Training and Scientific Institute of Energy Saving and Energy Management (IESEM)** trains students in perspective and actual areas of power engineering, which opens up new opportunities in the labor market for young professionals-graduates.

During its existence, the Institute has trained more than 10,000 engineers and masters. Departments of the Institute train specialists from many countries: Albania, Algeria, Vietnam, Cuba, Iraq, Jordan, Nepal, Syria, and others. Students from Germany, Spain, Italy, Norway, and other countries trained at the IESEM at various times within the framework of international projects. IESEM professors undertook an internship and taught the students in Belgium, Brazil, Cambodia, Colombia, and Norway.

Institute trains specialists for electric and fuel power complexes, civil engineering works, and environmental protection. Graduates are capable of developing, designing, and operating energy complexes and systems and creating modern energy-saving systems for eco-friendly energy management.

Institute graduates work at the enterprises and organizations of various industries of Ukraine, the CIS, Asia, Europe, and America in the positions of:

Experts on energy efficiency

Energy auditors and inspectors in the energy sector

Heads, leading experts of structural divisions of enterprises and organizations on electric energy of fuel and energy complexes

Leading experts in mining, building and operation of urban underground structures

Experts in institutions for ecological monitoring that provide consulting and engineering services



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2. STRUCTURE

Institute of Energy Saving and Energy Management consists of

- Department of Electric Power Supply;
- Department of Heat Engineering and Energy Saving;
- Department of Automation of Electrotechnical and Mechatronic Complexes;
- Department of Geoengineering;
- Department of Labor Protection, Industrial, and Civil Safety;
- 15 research laboratories,
- Energy Managers Training Center;
- Research Institute of Energy and Automation "Energy";
- Educational Scientific Center "Energy for Sustainable Development".

3. EDUCATIONAL PROGRAMS

Levels of higher education. Training of students at the **IESEM** is carried out at three levels of higher education.

At the first level (Bachelor's course, I–IV academic years) the students acquire fundamental knowledge in physics, mathematics, mechanics, computer engineering, and special disciplines. During the fourth year, they prepare and defend the bachelor's thesis and acquire a bachelor's degree.

At the second level, (Master's course, I–II academic years) students acquire relevant professional skills including laboratory practice. Applicants prepare and defend a master's theses and acquire a master degree.

The third educational-scientific level – postgraduate studies, I–IV academic years. Applicants defend their dissertations and they are awarded the educational qualification of Doctor of Philosophy (PhD).

Terms of training: Bachelor – 4 years; Master (education-professional program) – 1.5 years; Master (education-scientific program) – 2 years; PhD – 4 years.



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1. Department of Electric Power Supply provides training under the following Educational Programs:

| Specialty | Educational Program | Levels of higher education | | |
|---|---|----------------------------|-------------------|----------------|
| | | First | Second | Third |
| Electric Power Engineering, Electrotechnics, and Electromechanics | Energy Management and Energy Efficient Technologies | Bachelor <i>EPP</i> | Master <i>EPP</i> | – |
| | | | Master <i>ESP</i> | |
| | Electric Power Distribution Systems Engineering | Bachelor <i>EPP</i> | Master <i>EPP</i> | – |
| | | | Master <i>ESP</i> | |
| | Electric Power Engineering, Electrotechnics, and Electromechanics | – | – | PhD <i>ESP</i> |

*Comment: EPP – Educational-Professional Program
ESP – Educational-Scientific Program*

Highly qualified graduates of the department are capable of developing, designing, and operating both the intelligent energy complexes and systems, as well as centralized and decentralized integrated power supply systems, creating an energy management system for industrial and municipal objects based on the Smart Grid concept. They are skilled in designing microsystems and virtual power stations, creating modern energy management system, working according to modern energy-saving, energy-efficient technologies, monitoring the energy consumption of industrial enterprises with the use of modern information and computer technologies.

2. Department of Heat Engineering and Energy Saving provides training under the following Educational Programs:

| Specialty | Educational Program | Levels of higher education | | |
|---------------------------|---|----------------------------|-------------------|----------------|
| | | First | Second | Third |
| Thermal Power Engineering | Energy Management and Energy Efficient Technologies | Bachelor <i>EPP</i> | Master <i>EPP</i> | – |
| | | | Master <i>ESP</i> | |
| | Thermal Power Engineering | – | – | PhD <i>ESP</i> |

*Comment: EPP – Educational-Professional Program
ESP – Educational-Scientific Program*





Education in Heat Engineering is a system of bachelor's training for various industries that are engaged in the production, conversion, transmission, distribution, and consumption of energy in its various forms. Students acquire a thorough in heat engineering, electrical engineering, computer science, energy audit, heat and electricity supply, energy efficiency, economics, and management.

3. Department of Automation of Electrotechnical and Mechatronic Complexes provides training under the following Educational Programs:

| Specialty | Educational Program | Levels of higher education | | |
|---|---|----------------------------|-------------------|----------------|
| | | First | Second | Third |
| Electric Power Engineering, Electrotechnics, and Electromechanics | Engineering of Intelligent Electrotechnical and Mechatronic Complexes | Bachelor <i>EPP</i> | Master <i>EPP</i> | – |
| | | | Master <i>ESP</i> | |
| | Electric Power Engineering, Electrotechnics, and Electromechanics | – | – | PhD <i>ESP</i> |

*Comment: EPP – Educational-Professional Program
ESP – Educational-Scientific Program*

Graduates of department are universal specialists of a wide profile in the field of high-

Specialists can perform the professional work of an electrical engineer in the process of designing systems for automation of technical processes, both in mining and in civil structures with subsystems for the use of electricity.

tech energetics, automation, computer science, and design. They are capable of reaching the acme of scientific, innovative, and commercial skills. Much attention is paid to the development of technical solutions for optimal energy-saving electric drive systems and processes with intelligent microprocessor control. The design of "smart house" management systems is a very important area of graduates' work.

Department graduates are skilled in developing, design and operating the electromechanical systems of the energy complex, electric power supply systems, and work with the use of both the modern technologies of mining and energy sector and modern systems of renewable energy sources. The scopes of their professional activity are electromechanical service of fuel and energy enterprises,



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transport, construction of underground urban structures, construction and operation of subways, research institutions, design, and research geotechnical institutes.

5. Department of Geoengineering provides training under the following Educational Programs:

| Specialty | Educational Program | Levels of higher education | | |
|-----------|---------------------|----------------------------|-------------------|----------------|
| | | First | Second | Third |
| Mining | Geoengineering | Bachelor <i>EPP</i> | Master <i>EPP</i> | PhD <i>ESP</i> |
| | | | Master <i>ESP</i> | |

*Comment: EPP – Educational-Professional Program
ESP – Educational-Scientific Program*



Experts-graduates of the department are capable of operating the modern mining equipment at the mining enterprises and objects of underground constructions. They are skilled in production process organization, designing of the technical documentation for the execution of mining and construction works, a methodology of statutory indicators calculation and drawing up of estimate documentation, calculation the cost of works, designing of underground structures and organization of underground space, have modern technology of computer design and computer-aided system of underground structures design and geomonitoring.

6. Department of Labor Protection, Industrial, and Civil Safety are staffing with the top-ranked teachers, which provides training of the themes: Life Safety, Work Safety, Work Safety in the Branch, and Civil Protection.

The department operates in the following areas:

- fundamental scientific research on the most important problems of scientific, technical, and socio-economic development of different sectors of the economy, rational use of human resources for the sustainable development of society;
- protection of life and health of workers, new technologies of prevention and treatment of common diseases;
- energy and energy efficiency.



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Energy Managers Training Center is an independent organization founded on the base of the Igor Sikorsky KPI. The major purpose of the center is to transfer the experience and "know-how" of the EU in the field of energy management for energy efficiency in all sectors of the economy. The center is equipped with modern technologies and equipment in the field of energy-saving to demonstrate the benefits of energy efficiency and achievements of various countries.



The high-level professionals perform training at the department. Most of them are professors of the Igor Sikorsky KPI. Upon successful completion of training courses, students obtain the state certificate and the certificate of the European Union in English.

4. TRAINING AND LABORATORY BASE

IESEM uses both the university-wide and own training rooms. The following specialized laboratories are in operation in Institute:

- Laboratory of Distributed Energy Sources;
- Intersectoral Complex Laboratory of Engineering Ecology;
- Laboratory of Electrical Measurement and Control of Power Consumption Modes;
- Laboratory of Electrical Equipment Installation and Operation;
- Laboratory of Power Supply Systems;
- Laboratory of Electricity Consumers;
- Laboratory of Electric Apparatus;
- Laboratory of Relay Protection and Automation;
- Training Laboratory for Heat Engineering Disciplines;
- Energy Managers Training Center Laboratory for Measurements and Energy Audit;
- Training Laboratory for Heat Engineering and Thermal measurements;
- Computer classes.

**University's Laboratory
for Upgrading of Training
Modules is creating
within the framework of
international project
CENEAST**



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5. RESEARCH ACTIVITY

Department of Electric Power Supply:

- development of concepts and strategies of energy saving in the short-medium term;
- development and implementation of methods and techniques of management of energy consumption modes and their control;
- development and implementation of methods and systems for multi-criteria power and electricity distribution at different levels of spatial, temporal, and situational control of power consumption in the new economy;
- development of methods of control and normalization of energy;
- development and implementation of methods and systems for energy-saving integrated management (active and reactive power, voltage) of modes of industrial electric supply systems;
- development and implementation of the existing in Ukraine systems of differentiated tariffs for electric energy;
- development and implementation of energy control systems, including control of the amount used of thermal energy, gas, water, oil, etc.;
- development of guidance documents for electricity metering in terms of the energy market, energy audit of industrial enterprises.

Department of Heat Engineering and Energy Saving:

- energy management and audit of industrial facilities and public utilities;
- investigation of heat supply efficiency in the municipal area;
- modeling of complex radiation and convective heat transfer at high temperatures;
- development and creation of a new class power generating units based on thermomolecular energy;
- usage of renewable energy sources in energy supply systems.

Department of Automation of Electrotechnical and Mechatronic Complexes

today has five science schools:

- The latest and resource-saving technologies in energy, industry and agro-industrial complex; theory of pulse-wave rock destruction. Development, reliability, and diagnostics of mining machines;
- contacting the working bodies of machines for the construction of underground structures of the city with the treating medium;
- infrafrequent vacuum-wave synergyvector systems with intelligent control and their implementation in the oil and gas industry;



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- cleaning of edge-water by physical fields;
- study of the nonlinear differential equations stability.

Research work at the *Department of Geoengineering* is performed in the one priority line of research: "Fundamental research on the most important issues of the development of scientific, technical, socio-economic and human potential to ensure Ukraine's competitiveness around the world and sustainable development of society and the state."

6. INTERNATIONAL PROJECTS AND COLLABORATION

IESEM carry out international cooperation in the framework of the following partnership agreements on cooperation and scientific exchange with:

- The Department of Geomechanics, Underground Construction and Management of Surface Protection of Faculty of Mining and Geology of the Silesian University of Technology "Polytechnica Silesia", Gliwice, Poland;
- The Open University of Varna, Varna, Bulgaria;
- The Mining Faculty of the National University of the mineral resource "Mining", St. Petersburg, Russia;
- The South-Russian State Technical University (Novocherkask Polytechnic Institute), Shakhty Institute (Branch), Shakhty, Russia;
- The Scientific and Technical University Krakow Mining and Metallurgical Academy (Akademia Gorniczo-Hutnicza im. Stanislawia Staszica), Krakow, Poland;
- The Clermont-Ferrand's Superior National School of Chemistry (Ecole Nationale Supérieure de Chimie de Clermont-Ferrand).

According to international programs, IESEM obtained scientific and educational equipment:

1. Joint venture "Altera" provides the electrical equipment for the creation of modern laboratory scientific research stands.

2. Klinkmann provides microcontrollers for the modernization of the laboratory "Microprocessor technics."



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3. Intergraph Corporation (USA) and Design Institute "Ukrneftehimproject" transfer the software to upgrade the "CAD" laboratory in the field of testing instruments design for the pipeline industry.



4. Cooperation between the Department and Research Laboratory of electrification of industrial enterprises of the University M'Hamed Bougara of Boumerdes (Algeria) within the frameworks of the definition of an overall strategy and creation a modern laboratory of the automated electric drive.

IESEM over the years has participated in several large-scale international projects.

Department of Electric Power Supply:

- International project Ukrainian-Norwegian Collaboration in Higher Education for Sustainable Energy Development. The aim of the project is to build out common and international platforms for the development of education for sustainable development of energy production.
- Project CENEAST "Modernization of curricula in the field of the built-up area in the Eastern Neighbourhood." This project was implemented within the framework of the Tempus program.
- GEF/UNIDO "The implementation of energy management systems in the industry of Ukraine." Specialists of the Department of Electric Power Supply are the project experts.
- International project "Manager of energy-efficient rehabilitation of buildings." The project aims to transfer German know-how in the field of rehabilitation of buildings and residential property management.
- PROMITHEAS-4 project "Transfer of knowledge and the necessary research for the preparation of policy proposals for mitigation actions and adaptation to climate change" was implemented with the support of the European Commission towards the Environment (climate change including) of the 7th Framework Program.
- Power Engineering. EU-Project (7th FP) PROMITHEAS-3.
- EU-BSEC Energy and Climate Policy Network. EU-Project (SSA) PROMITHEAS-2.
- TACIS Project EUK9701: Strengthening Energy Management Training Actions throughout Ukraine (NIFES Consulting Group, UK, March Consulting Group, UK, Tebodin Consultants & Engineers, Holland).
- INCO-COPERNICUS Program. Project «DEMOSOLAR EAST-WEST».



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- Energy Efficiency at Primary and Secondary Schools. BISTRO Project BIS/97/005.
- Modernization of Heating. Grant of the Danish Government.
- DSM-95, 97. International Conferences on Demand Side Management. BISTRO Projects.

Department of Heat Engineering and Energy Saving:

- The international project according to INTAS program 05-1000008-8111 "AHP crucibleless crystal growth: method development and investigation of faceted dielectric crystal growth".
- Participation in the international program TEMPUS IV "CENEAST", which aims to introduce the principles of the Bologna process in the educational process of the Igor Sikorsky KPI.
- International project "Energy Efficiency in Buildings": "Energy Management in Municipalities" (experience of Ukraine and the EU).
- International educational project SPARE, the final phase of the National International Competition of youth projects on energy efficiency "Energy and Environment".
- Project "Municipal Heat Supply Reform in Ukraine", which is implemented in the framework of the US Agency for International Development (USAID), the program "Energy-efficient campuses."
- Cooperation in the framework of the Memorandum of Understanding between the Institute for Energy Saving and Energy Management of the National Technical University of Ukraine "Kyiv Polytechnic Institute" (Kyiv, Ukraine) and the University Ecole Polytechnique - Paris.
- Training of graduate students and staff of the department at the Higher National School of Chemistry of Clermont-Ferrand (Ecole Nationale Supérieure de Chimie de Clermont-Ferrand).



Department of Labor Protection, Industrial, and Civil Safety:



- international mobility project Erasmus Mundus Action 2 EUROEAST; Contract #2012-2740/001-001-EMA2; recording date at the University – 11/5/2012.



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