«…experts in the field of nanoelectronics, biomedical electronics, acoustics, and acousto-electronics, industrial electronics, radio electronics and telecommunications, electronic systems. Graduates confidently use modern computer design technology, are skilled in developing and operating electronic and acoustic apparatuses, devices, and systems…»

INFORMATION
PACKAGE

**FACULTY
OF ELECTRONICS**

Kyiv, 2021

CONTENT

*** *Information is current as for the 2021/2022 academic year. Next academic year, there may be minor changes in the list of specialties and educational programs.*
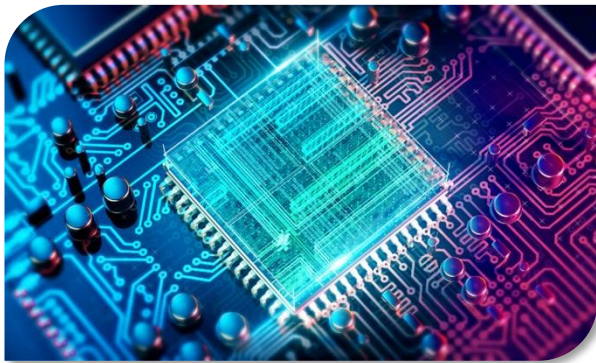
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1. COMMON DESCRIPTION OF THE FACULTY

Modern development of electronics and electronic appliances is associated with a new element base and technologies of micro and nanoscale with a high level of integration, new methods of design and construction of electronic devices and systems using powerful computing and artificial intelligence technologies, special software and information management. Graduates of the **Faculty of Electronics** (**FEL**) have the relevant qualification, theoretical knowledge, practical skills in modern technologies, and element base for creating competitive electronic equipment.

The training of qualified professionals in the sphere of electronics, electrical engineering, as well as in the areas that are related to computerization, is impossible without the real scientific and technological activities of our faculty specialists. The **Faculty of Electronics** was founded in October 1962 and consisted of three departments. Today more than 1,000 students are training at the **FEL**, including 28 foreigners.

The faculty trains specialists in the field of micro- and nanoelectronics, biomedical electronics, acoustics, and acoustoelectronics, multimedia electronic systems, telecommunications, and industrial electronics. Graduates confidently use modern computer design technology, are skilled in developing and operating electronic and acoustic apparatuses, devices, and systems for a wide range of destinations.

Students acquire knowledge and skills of:

Electronic systems	**Biomedical electronics**
Acoustics and acoustoelectronics	**Radioelectronics and telecomunications**
Industrial electronics	**Nanoelectronics**

Graduates of **FEL are fluent in** modern computer technology design, **develop and operate** electronic and acoustic instruments, multipurpose devices, and systems.

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2. STRUCTURE

The **Faculty of Electronics** consists of five departments:

- **Microelectronics Department;**
- **Department of Electronic Devices and Systems;**
- **Electronic Engineering Department;**
- **Department of Acoustic and Multimedia Electronic Systems;**
- **Department of Electronic Computational Equipment Design.**

The Research Institute of Electronics and Microsystems Engineering operates based on the faculty.

3. EDUCATIONAL PROGRAMS

Levels of higher education. Training of students at the **FEL** is provided at three levels of higher education.

At the first level (Bachelor's course, I-IV academic years) students acquire fundamental knowledge in physics, mathematics, mechanics, computing, informatics, 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 to defend a master's thesis and acquire a Master's 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. Microelectronics Department as a leader in the field of solid-state electronics in Ukraine established many internationally recognized schools of science. Department provides training under the following Educational Programs:

Specialty	Educational Program	Levels of higher education		
		First	**Second**	**Third**
153 Micro and Nanosystem Engineering	Micro- and Nanoelectronics	Bachelor *EPP*	Master *EPP*	–
			Master *ESP*	–
	Micro and Nanosystem Engineering	–	–	PhD *ESP*

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

The modern world is impossible to imagine without electronics, which cover all areas of human activity. Micro- and nanoelectronic technologies are the basis of all areas of modern electronics - computer technology, telecommunications, avionics, space and medical technology, energy. It provides the most fundamental training in physical and mathematical disciplines, compared to other specialties in electronics.

Our graduates are capable to conduct theoretical and experimental research in micro- and nanoelectronics, designing and constructing electronic apparatus and devices of various levels of complexity (from elementary components to ultra-complex systems, including microprocessors and microcontrollers, crystal systems, MEMS / NEMS components), create modern microelectronic information systems, including artificial intelligence, neural networks, wireless sensor networks, e-health systems, etc. Students also obtain a universal education in computer technology, object-oriented, and systems programming.

Fundamental training and a broad outlook that students obtain while studying, allow graduates to easily adapt to the modern world, realize their potential in the industry, research and educational institutions, and business in Ukraine and around the world.

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2. Department of Electronic Devices and Systems provides training under the following Educational Programs:

Specialty	Educational Program	Levels of higher education		
		First	**Second**	**Third**
171 Electronics	Electronic Components and Systems	Bachelor *EPP*	Master *EPP*	–
			Master *ESP*	–
	Electronic Devices and Equipment	Bachelor *EPP*	Master *EPP*	–
			Master *ESP*	
	Electronics	–	–	PhD *ESP*

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

Training is carried out in the framework of educational and scientific school "Theoretical basis of transformation of electric energy parameters", "Electron-beam devices and technologies", and "Plasma physical and technical systems for the technological purpose.

Based on the fundamental physical and mathematical, technological, circuit engineering, professional education and research cycles, Department provides multidisciplinary training of bachelors, masters, and PhDs for the research, design, organizational-methodical, scientific, and teaching activities in the field of research, design, production, and operation of multipurpose electronic devices.

As part of the master's program, students conduct research in the field of power electronics, computer and microprocessor technology, programming microcontrollers, specialized control and regulation of technological processes, energy efficient control of distributed power generation, implementation of new technologies for big data and Internet of Things in MicroGrid and SmartGrid, development of high-efficiency converters for various purposes, including carbon-free transport, welding of metals and biological tissues, fast charging devices of combined capacitive energy storage devices.

The advantage of training is the emphasis on fundamental education of students in programming (Assembler, C, C ++, CSharp, Java, HTML, SQL), analog and digital circuitry, computer circuitry, microcircuitry, modern microprocessor technology, work with design software , analysis, calculation and modeling of electronic circuits PSpice, LTSpice, OrCAD, P-CAD, AutoCAD, MathCad, MatLab, Mathematica, Compass, signal and image processing, machine learning, and the Internet of Things

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The main areas of specialists' training are as the following:

- Development and design of the general-purpose microprocessor devices and systems for control and regulation;

- Development and design of power electronic devices and systems for conversion and regulation of electricity parameters;

- Computer methods of information design and processing;

- Use of information computer equipment in control and display devices;

- Operation and maintenance of electronic equipment for general use

The curricula for the preparation of bachelors and masters are subject to constant updating based on coordination with the basic enterprises "Melexis-Ukraine", "Kostal-Ukraine", "Di-Elcom" and other specialized enterprises of the industry.

3. Electronic Engineering Department provides training under the following Educational Programs:

Specialty	Educational Program	Levels of higher education		
		First	Second	Third
153 Micro and Nanosystem Engineering	Electronic Micro- and Nanosystems and Technologies	Bachelor *EPP*	Master *EPP*	–
			Master *ESP*	–
	Micro and Nanosystem Engineering	–	–	PhD *ESP*

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

The training focuses on research, development, implementation, and application of modern electronic micro- and nanodevices and systems, methods and technologies for

their manufacture using modern information technologies, including electronic micro- and nanosystems for biomedical purposes.
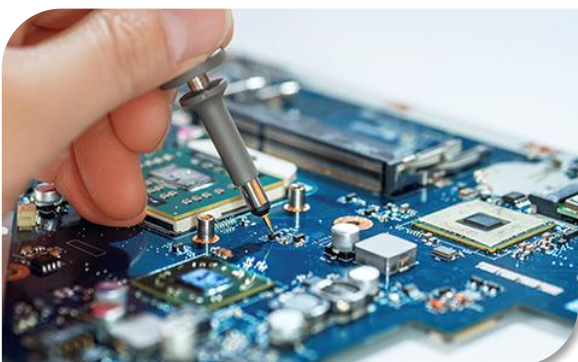
The department trains professionals in design of integrated micro- and nanoelectronics, development, and implementation of computer medical diagnostic systems, computer simulation of microelectronic devices and equipment, the design of components for telecommunication systems, the creation of automatic analysis of measured data.

The main principles of training at the Electronic Engineering Department are thorough training of students in fundamental and applied disciplines, in particular, solid

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state physics, solid-state micro- and nanoelectronics, computational methods, programming, design methods, analog and digital circuitry, microtechnology, microtechnology and images, design of electronic micro- and nanosystems, including biomedical signals and systems, as well as work with modern software for design and modeling of electronic circuits CADENCE, PSpice.

The department provides international mobility in micro- and nano electronics and nanotechnologies, including biomedical systems and technologies at the world's leading universities, internships, and double master's and doctoral degrees at universities in France, Belgium, Germany, Spain, Japan, South Korea by agreement programs.

The department established a laboratory for analog design of micro- and nanoschemes with the ability to obtain certificates from licensed computer-aided design systems for micro-and nanochips from CADENCE.

4. Department of Acoustics and Multimedia Electronic Systems provides training under the following Educational Programs:

Specialty	Educational Program	Levels of higher education		
		First	**Second**	**Third**
171 Electronics	Acoustic Electronic Systems and Acoustic Information Processing Technologies	Bachelor *EPP*	Master *EPP*	–
			Master *ESP*	–
	Electronic Systems of Multimedia and Internet of Things Technology	Bachelor *EPP*	Master *EPP*	–
			Master *ESP*	
	Electronics	–	–	PhD *ESP*

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

Acoustics are used in various fields, such as architecture, industry, medicine, music events.

The main task of an acoustic engineer, regardless of the industry, is to provide a comfortable pastime for the listener in rooms where there is sound. Acoustic engineers work to reduce noise levels in residential, commercial, or public spaces. They are working on the introduction of innovative technologies and new materials. They advise construction companies to ensure optimal sound insulation, in industrial enterprises, acoustic engineers help reduce noise and vibration from working machines.

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Acoustic engineers are extremely needed in medicine; they develop and maintain complex medical equipment, such as modern human hearing diagnostics, digital hearing aids, and cochlear implants, ultrasound diagnostics and therapies, ultrasound surgical devices.

Students learn how to use the application software for acoustic signal and image processing, mathematical and virtual modeling, and the design of acoustic devices and systems. Considerable attention is paid to the design of ultrasonic computer introscopy and tomography systems, measuring and diagnostic equipment, development of acoustic instruments, equipment for home and professional recording studios, and the like.

In course of master's training, the department proposes a double degree program in acoustoelectronics jointly with the Universite du Maine, Le Mans, France. The program of scientific internships of doctors of philosophy operates with the same university.

Based on the concluded agreements on cooperation and partnership in the field of acoustics and electronics, the curricula of the department are constantly coordinated with the needs of partner companies. They are International technology company Ajax Systems, Goldberry LLC (Espresso TV channel), State Enterprise "Kyiv Scientific Research Institute of HYDRODEVICES" LLC (Ukrainian Defense Industry "UKROBORONPROM"), State Enterprise "Prof. Kolomiychenko Institute of Otolaryngology of the National Academy of Medical Sciences of Ukraine", State Academic Orchestra "RadioBand of Oleksandr Fokin", "ULTRAKON-SERVICE LLC", and "MAG AUDIO LLC", Aurora Hearing Rehabilitation Center LLC, KIND INTERSLUKH KYIV LLC, Acoustic Group Ukraine LLC.

Jointly with the State Academic Orchestra "RadioBand of Olexander Fokin" department train students upon the dual form of higher education based on the certificate program "Audio Producing" for the master's level of higher education.

To ensure comprehensive training of specialists under the agreement on dual education, the department has created joint certificate programs with the international technology company Ajax Systems –"Electronic wireless security systems and the Internet of Things" for bachelors, and "Software and hardware" for masters.

5. Department of Electronic Computational Equipment Design provides training under the following Educational Programs:

Specialty	Educational Program	Levels of higher education		
		First	Second	Third
172 Telecommunications and Radio Engineering	Information-Computing Means for Radio Electronic Systems	Bachelor *EPP*	Master *EPP*	–
			Master *ESP*	–
	Telecommunications and Radio Engineering	–	–	PhD *ESP*

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

Department graduates can:

- Develop information systems and electronic computing machines, "systems-on crystal" (SoC) based on the single-crystal CISC, RISC and ARM microcontrollers, digital signal processors DSP and FPGA;

- Develop software with the use of Arduino, C, C++, Assembler, PHP, MySQL, Verilog, and VHDL, be skilled in HTML and CSS, use applied software packages Arduino-IDE, MatLab, OrCAD, Altium Designer, Intel Quartus Prime, Code Composer Studio, IAR Workbench, as well as a tool for programming of measuring and control computer complexes LabVIEW;

- Create databases, develop own utilities and program systems on the high-level languages, create own web pages and sites, organize various web services;

- Design, deploy, adjust the setting and maintain computer networks with the use of technologies Wi-Fi, Bluetooth, Ethernet, DSL, ZigBee, personally build any kind of network: both the home and large corporative one;

- Go all the way of creating the electronic devices, beginning with the development of circuit, algorithmic, software, and design solutions and finishing in its manufacturing.

Research Institute of Electronics and Microsystem Engineering engaged in the development and implementation of modern electronic equipment and devices for industry, energetics, communications, and medicine.

The main directions of Institute activity: control stations for protection of microprocessor-controlled electric motors; parallel type compensators of reactive power based on IGBT modules; charge-discharge and charge-stabilizing devices; uninterruptible power supply systems; piezoelectric motors for automation systems; piezoceramic electrical filters; photovoltaic panels and inverters; sensors and sensor systems of automation; electrosurgical devices; computer security systems VisaNet ™

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4. TRAINING AND LABORATORY BASE

At the ***Electronic Engineering Department*** operates the Laboratory of the Tower Semiconductor Ltd. equipped with modern systems for design of micro- and nanoelectronic systems CADENCE, which provides the opportunity to obtain CADENCE certificates for students, graduate students, and professionals.

In the laboratory, higher education students have the opportunity to master the principles and technologies of designing chips, mostly analog for electronic devices and systems for various purposes.

In addition to learning tasks, undergraduate and graduate students may also conduct research. The laboratory is certified in the field of Custom IC Design (custom chip design). For the annual certification, the software is updated to the latest versions, and teachers working in the laboratory are trained and pass the relevant exams.

Students have the opportunity to register in the Cadence Learning & Support system and receive training through online courses. Students who have successfully passed the exam are issued a certificate and a digital sign.

The ***Department of Electronic Devices and Systems*** has a Laboratory of Indicator Devices, where several high-tech digital devices for processing X-ray images for industrial and medical purposes are currently developed.

The laboratory is developing a hardware video processor VP-063, designed to work as part of the equipment of industrial X-ray television flaw detectors. There are significant results in the field of image format conversion. These developments are carried out by students and graduate students under the scientific guidance of the department teachers.

The educational process is provided by laboratories of the theory of electric circuits and electromagnetic systems, electronic and microprocessor devices and systems, computer and Internet technologies, power electronic devices and systems, microprocessor control systems MicroGrid and SmartGrid, power electronic systems, devices and systems for information display and registration, computer technology and computer systems, electronic computer systems.

The department has a branded laboratory equipped with modern equipment of Melexis-Ukraine - the world leader in the production of integrated circuits for automotive electronics.

Department of Acoustics and Multimedia Electronic Systems has the Laboratory of Examination and Correction for providing advice to students, organizations, and individuals for the acoustic examination and correction, as well as the implementation of educational and practical projects.

The department has modern educational and scientific laboratories: wireless security systems Ajax Systems, electronic means of acoustic control NDT-Lab "ULTRACON-SERVICE", medical acoustics, functional units of telecommunication systems and EMC,

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measuring systems, radio receivers, power supply and electromagnetic compatibility of electronic equipment, magnetic recording systems, ultrasonic measuring transducers of physical quantities, equipment, and operation of film installations, applied television and applied television. of computer technologies of audiovisual content processing. The department has a certificate for student training under the Cisco program.

Department of Electronic Computational Equipment Design uses in the learning
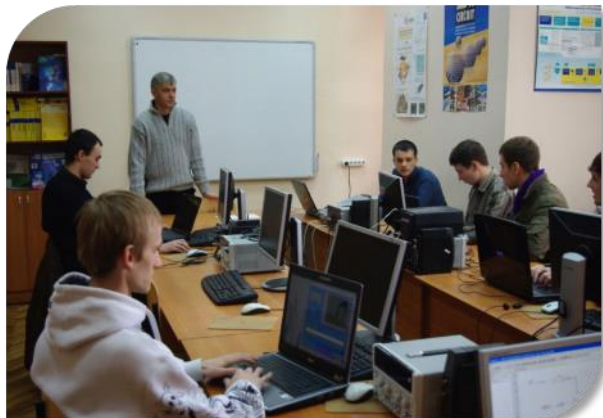
process some modern laboratory facilities in the form of evaluation modules of type DE-1 SoC, DE2, DE5 from IntelFPGA (former ALTERA), BeagleBoard on the base of OMAP3, BeagleBone Black on the base of ARM Cortex A8, circuit boards on the base of platforms C28x, C55x, C64x and MSP430, ASLK-PRO from the firm TEXAS INSTRUMENTS, C51, AVR from the firm ATMEL, STM32 from the firm STMicroelectronics, Arduino Leonardo, portable solutions for wireless technologies in the form of ZigBee-modules Tmote Sky, microcomputers Intel Galileo and Intel Edison, telecommunication facilities Cisco.

Official Training Center of Teaching of PLD Designing Technologies from IntelFPGA (former ALTERA), and Educational Laboratory of TEXAS INSTRUMENTS, Scientific Training Center "Lean production", training and research laboratories "KPI - GlobalLogic Ukraine" and microelectronics, telecommunications and robotics LAMPA Kids, operate at the department, as well as teaching laboratories: Laboratory of Digital Technology Digital Lab, Laboratory of Microprocessor Devices, Laboratory of the Physical Fundamentals of Microelectronics, Laboratory of Information Technologies, Laboratory of Analog and Digital Electronics, and Open Laboratory LAMPA on its base.

In the laboratories LAMPA and LAMPA Kids, students of the department, faculty, and university, as well as schoolchildren study electronics in extracurricular time, create prototypes of diploma and course projects and develop their startup projects using the above electronic modules.

5. RESEARCH ACTIVITY

The main research areas of *the Microelectronics Department:*

- Physics of semiconductor and dielectric materials;
- Synthesis of new materials for electronics;
- Renewable sources of energy, photovoltaics;
- Piezoelectric devices and equipment;
- Microelectronic sensors, the functional elements of the electronics;
- Dielectric microwave components and devices;
- New semiconductor devices;
- Computer technology;
- Ultrasonic sensors, vibration sensors;
- Microwave measuring cell for *tg* measuring in the range 5.20 GHz;
- The microstructure of composite materials;
- Device for power supply controlling of computers;
- New amorphous semiconductors and composites.

Areas of research at the *Department of Electronic Devices and Systems:*

- Image processing in technical vision systems for industrial and medical purposes;
- Measuring transducers of physical quantities based on surface acoustic waves;
- Visualization and positioning of nanoscale objects;
- Sources of charged and neutral particles;
- X-ray television systems of non-destructive quality control of products;
- Analysis and synthesis of gate transducers of the fixed and variable structure;
- Microprocessor control algorithms and digital signal processing;
- Devices and systems of power electronics;
- Energy-efficient power management in electrical complexes and systems MicroGrid and SmartGrid.
- Intelligent processing of big data in systems with a distributed generation of electric energy;
- Internet of Things technologies in electronics;
- Methods of analysis and monitoring of biotelemetric indicators.

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Department organizes permanent seminars (once or twice per month) of the National Academy of Sciences of Ukraine titled "Semiconductor transducers in the industrial electronic devices", where academic staff, students, and postgraduates can test the results of their scientific investigations.

Scientific teams and laboratories of the *Electronic Engineering Department:*

- Team for designing micro- and nanoelectronic components and systems;
- Team for analysis and modeling of biological signals and machine learning methods in biomedicine;
- Team on microwave electronics;
- Team on biophysics and research of subtle manifestations of the electrical activity of the heart;
- Biomedical electronics laboratory.

Scientific directions of the *Electronic Engineering Department* are as follows:

- Micro- and nano-semiconductor structures and modeling of electronic devices, devices and nanosystems;
- Methods of designing micro- and nanosystem technology, including tools and systems for biomedical purposes, signal processing using machine learning methods;
- Circuit design of microwave and EHF integrated circuits;
- Methods for measuring the properties of materials at ultrahigh frequencies, design of passive ultrahigh-frequency devices.

The Department of Acoustic and Multimedia Electronic Systems carries out the following research projects:

- Creation of the theory of the human auditory system, which allows determining the quantitative parameters of its norm;
- Computer modeling of the human auditory system;
- Development of new objective methods of diagnostics of human hearing and audiological means for their provision;
- Development of new algorithms of music therapy for the treatment of disorders of the central nervous system and effective psychological rehabilitation of humans;
- Development of broadband ultrasonic non-invasive diagnostic systems: active - echoscopes (scanners, ultrasound) to obtain images of internal organs, and passive - acoustothermometers to measure the human body depth temperature;
- Development of broadband therapeutic devices;

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- Systems of automatic speech recognition;
- Wireless security systems;
- Application of technologies and technical means of intelligent networks to ensure the exchange of information at a distance;
- Networks and multi-channel telecommunication systems;
- Systems and technical means of radio and television broadcasting, electroacoustics and voice informatics, multimedia equipment;
- Systems and technical means of information protection in telecommunication systems;
- Satellite and mobile communication systems;
- Application of modern technologies and technical means of registration and reproduction of information in information systems for industrial, public, and household purposes;
- Systems and technical means of audio and video information reproduction for large human contingents, limited contingents, individuals;
- Systems and technical means of registration and processing of scientific, technical, and production information;
- Management of operational and service maintenance of audio and video equipment;
- Voice and video information compression systems;
- Electromagnetic compatibility of electronic equipment.

Research directions of the *Department of Electronic Computational Equipment Design:*

- Design the "systems on a chip" ("System-on-a-Chip" - SoC), "networks on a chip" ("Network-on-a-Chip" - No C), and electronic computing problem-oriented systems for various functional purposes, including the number of "Embedded Systems" for recognition and automatic tracking of objects based on modern ARM, DSP, and SoC technologies.
- Research in the field of intelligent electronic information systems, including artificial intelligence, expert systems, fuzzy systems, and decision-making systems. Research and development of the concept of open-closed systems (OS-System) and development on this basis of adaptive programming technology - an environment for creating correct information technology systems for various purposes.
- Intelligent information networks, the methodology of construction of multi-information networks, intelligent control and monitoring system in multiservice networks;
- Computer telephony systems, coding, and synthesis of speech in IP-telephony, the IP network security systems;

- New technologies and electronic tools for diagnosing the most common diseases.
- Development and design of microprocessor devices and control systems, control and regulation of general purpose.
- Implementation of methods of modern "lean production", including the management of the quality, environment, occupational safety and occupational health, food safety, information security, integrated management systems, industrial management systems based on international standards of ISO 9000, ISO 14000, ISO 22000, ISO 27000, OHSAS18000; SA8000 and IRIS.

The international scientific and technical conferences that are held at **FEL**:

- The annual conference of young scientists "Electronics",
- Every two years - the international scientific and technical conference "Problems of modern electrical engineering" with the publication of scientific papers of the authors in the journal "Technical electrodynamics", which is included in the List of professional publications of Ukraine and the international scientific base Scopus,
- Annual international scientific and technical conference "Electronics and Nanotechnologies ElNANO" under the aegis of IEEE with the publication of scientific reports of authors in the digital library IEEExplore and the international scientometric base Scopus.

The faculty publishes two scientific journals, namely "Microsystems, Electronics and Acoustics" and "Electronic and Acoustic Engineering".

6. INTERNATIONAL PROJECTS AND COLLABORATION

Faculty of Electronics participates in the program of dual master's degree in Microelectronics together with the Electronics Packaging Lab (IAVT) of the Dresden University of Technology (Germany).

Faculty signed contracts on academic exchange and agreements on research cooperation with the KTH Royal Institute of Technology, Stockholm (Sweden); Korea Institute of Science and Technology (South Korea); Central School of Electronics, Paris (France); College of Engineering, Korea University (South Korea); Yonsei College of Electronics (South Korea); Parthenope University of Naples (Italy), Riga Technical University (Latvia), Wroclaw University of Technology (Poland)

> **The Faculty has a long history of international cooperation and is well known in the world. Many teachers and students are members of international organizations CODATA and IEEE**

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Microelectronics Department cooperates with Germany (Berlin Federal Institute for Materials Research and Testing, universities of Aachen, Duisburg), France (universities of Paris, Limoges), Czech Republic (University and the Institute of Physics in Prague), the Netherlands (Delft University), Portugal (University of Aveiro).

The department also participates in the international program "Double Diploma". Under this program, students who successfully study in the master's program undergo an internship at the Technical University of Dresden (Germany) lasting 1 year, and obtain a certificate that allows employment in EU countries.

International relations of the **Department of Electronic Devices and Systems** is characterized by the activity in two directions: training of foreigners and inter-university cooperation.

Department performs joint projects with foreign partners:

- Technical University Dresden – scientific work and training of young scientists, graduate, and post-graduate students, joint research on the transmission of information signals on the electric grids;

- The University of Zielona Góra, the Maritime Academy of Gdynia (Poland), Ritsumeikan University, Kyoto (Japan), Tallinn University of Technology (Estonia), Georgian Technical University, Tbilisi (Georgia) - joint research in the field of power electronics, converter equipment, systems and algorithms of signal control and processing, participation in competitions of joint Ukrainian-Japanese research projects;

- Riga Technical University, Latvia (scientific training, inter-university cooperation agreements, review of articles and co-organization of international conferences);

- Wroclaw University of Technology (academic mobility of students and scientific and pedagogical personnel in the framework of Erasmus+ project, joint research).

The department provides students with the opportunity, starting from the second year, to participate in the program "Double Diploma", created jointly with the Dresden Technical University (Technische Universitet Dresden). In the fourth and fifth years, students who successfully study in this program and at the same time have already mastered the German language course, undergo a laboratory workshop in the laboratories of Dresden Technical University, as well as perform course and diploma projects there. Students who have completed the Double Diploma course can enter the graduate school of the Dresden University of Technology on a competitive basis.

In 2021, a dual supervising program has launched for graduate students of the University of Lorraine, GREEN Laboratory, Nancy, France.

Teachers and scientists of the *Department of Acoustics and Multimedia Electronic Systems* maintain creative contacts with colleagues from Germany, Poland, the USA, Hungary, Bulgaria, the Czech Republic, and Slovakia. The Department organized the Ukrainian Branch of the international Audio Engineering Society (AES).

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The department has implemented an author's program "Fundamentals of sonar measurements" to improve the skills of foreign specialists of the Republic of India.

As part of a memorandum of cooperation with a leading international technology company Ajax Systems, and with its charitable assistance, the Department established an Educational and Scientific Laboratory of Electronic Wireless Security Systems Ajax Systems to train specialists in electronics, acoustic electronic systems and information technology such as security, with sensors of different types, Internet of Things technology, embedded systems.

The laboratory is equipped with all the apparatus necessary for the practical training of a modern electronics engineer. To provide students with practical experience with measuring equipment, there is a spectrum analyzer, multi-channel oscilloscopes, multimeters and a large number of models, and development tools. Soldering equipment and a 3D printer will be required to acquire equipment design skills.

Department of Electronic Computational Equipment Design fruitfully cooperates with leading international companies in the field of electronics as Intel FPGA (USA), Texas Instruments (USA), and as well as the leading IT company GlobalLogic and its representative in Ukraine "GlobalLogic Ukraine".

The work of the official Training Center for Product Design Technologies of the Intel FPGA company in Ukraine is performed based on new educational and scientific laboratory Digital Lab technologies within the frame of the international program Intel TPP (Training Partner Program). The activity of the Texas Instruments Training Laboratory is performed according to the international program Texas Instruments.

The Department is also cooperating with the Belgian company Melexis. Students are training in techniques of digital design and testing of integrated microchips in general Educational and Scientific Laboratory Igor Sikorsky KPI - Melexis.

Within the framework of the partnership and cooperation agreement with the leading IT company "GlobalLogic Ukraine" with its financial assistance, the department established a training and research laboratory "KPI - GlobalLogic Ukraine" to design embedded technology solutions.

Also, the Department organizes and conducts international seminars in the enterprises of the Republic of Belarus and Kazakhstan in the form of training of internal auditors in quality management systems, energy management, environmental management, and the management of the food industry following the requirements of the international standards ISO9001, ISO19011, ISO50001, ISO22000, ISO22002, and ISO14001.

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