"...electronic methods are used in data transmission systems, radio communications, radio broadcasting, television, radiolocation, radio navigation, radio control, automation and computer engineering..."

INFORMATION PACKAGE

FACULTY OF RADIO ENGINEERING

Kyiv, 2020

CONTENT

****** Information is current as for the 2020/2021 academic year. In the next academic year, there may be minor changes in the list of training specialties and educational programs/specializations.***

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1. COMMON DESCRIPTION AND STRUCTURE OF FACULTY

Faculty of Radio Engineering (FRE) was established based on the radio laboratory of the electrical engineering faculty of Kyiv Polytechnic Institute, founded by V.V. Ohiyevskiy in 1921.

First electric engineers in radio specialty were graduated in 1928. In 1930 the faculty of electrical engineering was separated and reorganized into Kyiv Power Engineering Institute, in which the radio-engineering faculty and the department of radio engineering were established. The faculty and the department were headed by prof. V.V. Ohiyevskiy. 1930 is considered as a year of birth of the Faculty of Radio Engineering of the Igor Sikorsky KPI. The regular graduation of radio engineers has started in 1931.

STRUCTURE

Faculty of Radio Engineering consists of 4 departments:

- **Department of Theoretical Foundations of Radio Engineering**
- **Department of Radio Engineering Devices and Systems**
- **Department of Radio Receiving and Processing of Signals**
- **Department of Design and Production of Radio Electronic Equipment**

and

- **Educational-Science Laboratory “KPI-QualiTech”**

1. Department of Theoretical Foundations of Radio Engineering trains highly qualified specialists with a degree in "Telecommunications and Radio Engineering" (educational program/specialization "Radio System Engineering"). Students deeply study the theory of electronic circuits, the theory of signals and processes of electronic devices and systems, the theory of processing analog and digital signals, the fundamental course of Electrodynamics and Radio Wave Propagation, theoretical bases and methods of engineering implementation of radiation devices, and receive space-time processing of information in the radio, telecommunications, and medical systems, design of smart antenna systems for various purposes.

2. Department of Radio Engineering Devices and Systems trains highly qualified specialists with a degree in "Telecommunications and Radio Engineering" (educational program/specialization "Radio Engineering Information Technologies"). Students learn in-depth information transmission theory, in which we consider systems of modern television, the mobile communication system of the second, third and fourth generations, local communication between devices over WiFi, Bluetooth; information extraction system, which includes radar systems, navigation systems; destruction of the enemy system information and the protection of private information; digital signal generation algorithms and their implementation on digital signal processors; modulation and coding techniques, adaptive digital signal processing techniques

3. Department of Radio Receiving and Processing of Signals prepares highly qualified specialists in the specialty "Telecommunications and Radio Engineering" (educational program/specialization "Radio Communication and Processing of Signals". Students study digital and analog electronics; programming of microcontrollers and microcomputers; adaptive, software-defined and special communication systems; modern information technologies; signal processing in communications systems; radio monitoring; methods and algorithms of digital processing of multidimensional signals; the identification, recognition, and restoration of signals and images; sophisticated digital filtering algorithms; artificial intelligence systems and neural networks in signal processing.

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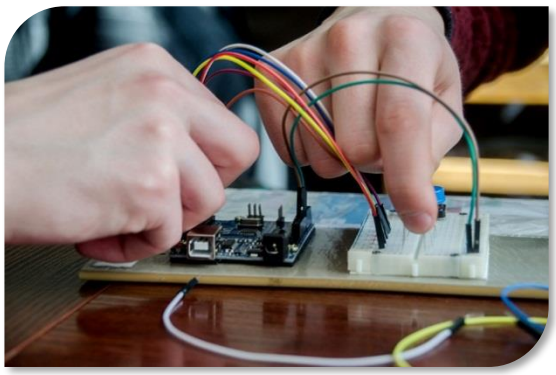
4. Department of Design and Production of Radio Electronic Equipment prepares highly qualified specialists in the specialty "Telecommunications and Radio Engineering" (educational program/specialization "Intelligent Technologies of Microsystem Radioelectronic Equipment". Students study intelligent systems, the principles of intellectualization of electronic equipment based on programmable microprocessors, design and technology fundamentals of telecommunications radio and electronic engineering, intelligent technology in the functioning of electronic equipment, its design, manufacturing and operation, fundamentals of micro - and nanosystem technology, hardware-software means universal and special purpose for the design and operation of electronic telecommunication equipment.



5. Educational and Scientific Laboratory "KPI-Qualitech" was established to train applicants for higher education, training and practical engineering skills to work with modern radio technologies based on the Department of Theoretical Foundations of Radio Engineering at the Faculty of Radio Engineering using equipment from world-famous companies for radio measuring equipment Rohde&Schwartz Advantest, as well as National Instruments, a world leader in virtual instrument technology, development, and production of systems and software for automated testing systems.

2. EDUCATIONAL PROGRAMS

***Levels of higher education*.** Training of students at the RF is carried out at several levels of higher education. At the first level (Bachelor's course, I – IV years) the students acquire fundamental knowledge in physics, mathematics, mechanics, computer engineering, and special disciplines. During the fourth year, they defend their bachelor's thesis and acquire a bachelor's degree.

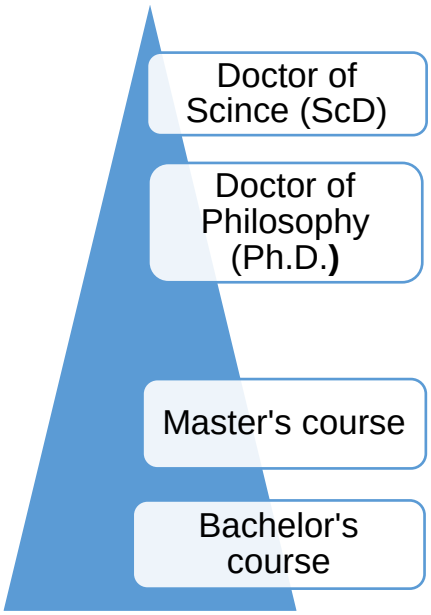
At the second level, (Master's course, I-II academic years) students acquire relevant professional skills including laboratory practice. Applicants defend a master's theses and acquire a master's degree

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

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

Training of specialists is carried out on the full-time and correspondence forms of education.

Specialties and educational programs/specializations:



Telecommunications and Radio Engineering

- Radio System Engineering
- Radio Engineering Information Technologies
- Radio Communication and Processing of Signals
- Intelligent Technology of Microsystem Radioelectronic Equipment

Faculty of Radio Engineering prepares highly skilled professionals capable of working efficiently at all stages of design and manufacturing of modern electronic devices and systems: satellite communication (GPS, GLONASS, Galileo, VSAT) and mobile (GSM, CDMA); wired (including optical lines) and wireless computer networks (Wi-Fi, Bluetooth); television and telecommunications systems (WiMAX, LTE, DVB-T2) special communication systems; microprocessor and computer control systems for domestic and industrial purposes; biotechnical and medical diagnosis and treatment systems; robotics and mechatronic systems.

Students of the Faculty of Radio Engineering complete the practice and work at enterprises not only in Ukraine but also abroad. Our graduates can be found in manufacturing plants: "Quasar", "Quantum", "the Kyiv factory "Radar", "Holding Company Ukrspetstechnika", "NPP "Kvant-Efir", "Romsat", "Arsenal", "UkrNDIRA", "Beam "and others. Also, our graduates work in most companies, satellite, and mobile communications, and Internet service providers: Lifecell, Kyivstar, Lanet, Volya, Freshtel, etc; in radio and television companies: STB, 1+1, Inter, KSTRC, and others; in research institutes and various medical institutions of Ukraine. Traditionally, the Security Service of Ukraine, the Foreign Intelligence Service of Ukraine, the Ministry of Internal Affairs of Ukraine, the State Customs Service, and other government agencies that have special departments of technical control and maintenance are interested in hiring our graduates. Most graduates work in foreign companies and their Ukrainian representative offices: Ericsson, Melexis, Luxsoft, Infineon Technologies, National Instruments, Cisco Systems, and others.

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3. TRAINING AND LABORATORY BASE

The Faculty of Radio Engineering has specialized laboratories

At the Faculty, students study in their building, which has lecture halls, equipped with multimedia learning tools, modern computer classrooms, and specialized laboratories to conduct educational and scientific research using both classical and modern instrumentation.

At the **Department of Theoretical Foundations of Radio Engineering** there are the following laboratories:

1. Laboratory of microwave devices
2. Laboratory of computer modeling
3. Laboratory of basics of electronics
4. Laboratory of RF circuits and signals
5. Laboratory of electrodynamics
6. Laboratory of antenna technology
7. Laboratory medical equipment
8. Laboratory of radio measurements
9. Laboratory of satellite information systems

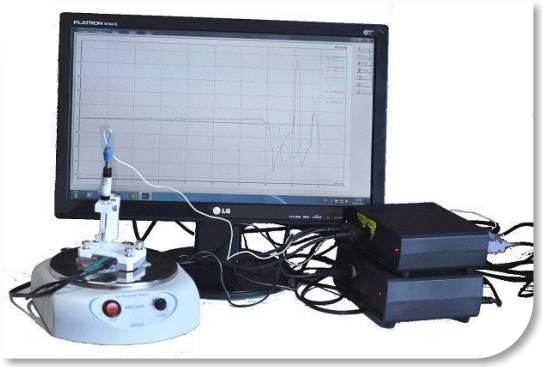
At the **Department of Radio Engineering Devices and Systems** there are the following laboratories:

1. Laboratory of systems of radiolocation and radio navigation
2. Laboratory of microwave devices
3. Laboratory of power supplies
4. Laboratory of elements and microwave devices
5. Laboratory of basics of television devices and systems
6. Laboratory of transmitters
7. Laboratory of computing techniques
8. Laboratory of components and microelectronics
9. Laboratory of digital signal processing and programmable logic integrated circuits.

At the **Department of Radio Receiving and Processing of Signals** there are the following laboratories:

1. Laboratory of digital television
2. Computer class radio-electronic and computer tools for creating multimedia
3. Computer class software development of electronic equipment
4. Laboratory of digital devices
5. Laboratory design of electronic equipment
6. Laboratory of radio receivers and analog circuitry

At the **Department of Design and Production of Radio Electronic Equipment** there are the following laboratories:



1. Laboratory of medical electronic industry
2. Laboratory of computer design
3. Laboratory radio design
4. Educational technology laboratory
5. The laboratory of audiovisual teaching methods
6. Educational-scientific laboratory of microwave radiometry, and measurements of microwave signals
7. Laboratory of microelectronics and microsystem technology

4. RESEARCH ACTIVITY

Scientific directions of the ***Department of Theoretical Foundations of Radio Engineering:***

- Theory and technique of: multi-band and multi-beam mirror antenna systems; dual-polarized broadband micro stripe antenna arrays; ultra-sonication dipole antenna arrays; micro stripe adaptive antenna phased arrays; ultra-sonication mirror antennas; microwave devices for converting the polarization of radio signals of ultra-high-frequency devices of separation of radio signals with orthogonal linear and circular polarizations (orthomodular upgrading users); microwave devices for separation of channels of transmission and reception of radio signals; one broadband and dual-band irradiated by mirror antennas with low cross-polarized radiation
- Electrodynamics of periodic structures, activation, and propagation of electromagnetic waves
- Electrodynamics of anisotropic middleware, nonreciprocal low-frequency devices
- Methods and means of pulse diagnostics; bioimpedance meter and impedance tomography; phase meter i spatial phase synchronization
- Sensitivity enhancing of communication systems
- Radio technical and sensor devices for medical diagnostics
- Theory of Signals

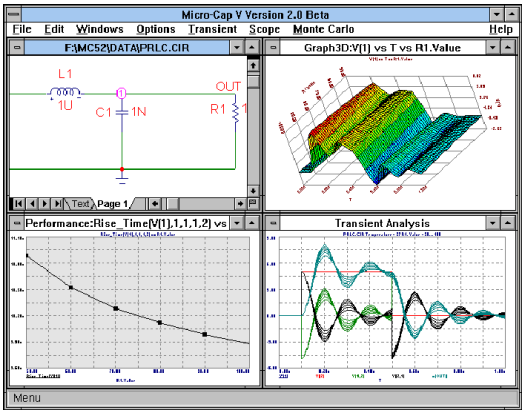
Scientific directions of the ***Department of Radio Engineering Devices and Systems:***

- Theory and technology of the digital formation and processing of complex radar and radio navigation signals
- Design of transmitter-receiver modules UHF band
- Development of software and hardware for forensic investigations
- Information systems and complexes of special purpose
- Methods of optimal and adaptive digital signal processing in radio systems.
- Adaptive methods of signal processing in radio networks
- Theory of digital communication. Mobile radio systems
- Numerical methods of devices simulations

Scientific directions of the ***Department of Radio Receiving and Processing of signals:***

- Methods of digital signal processing and pattern recognition in non-traditional coordinate bases.
- Methods and means of impedance tomography.
- Speech coding, compression algorithms of the speech signal.
- Devices and systems for HF and microwave telecommunication, information security, process measurements.
- Development and research the telecommunication systems of nanosatellites.
- Physics and technique of power ultrasound.
- Radio engineering devices and systems for the Internet of Things (IoT).
- Creation of means of digital communication.

Scientific directions of the ***Department of*** **Design and Production of Radio Electronic Equipment*:***



- Computer-aided design of integrated circuits and components on printed circuit boards
- Mathematical models of physical processes in electronic devices
- The study of electromagnetic compatibility. Development and improvement of means and measures of protection of the information
- Development of software and hardware on microcontrollers and embedded microcomputers
- System short-range radar. Non-linear radiolocation
- Creation and implementation of methods and tools functional and nanoelectronics

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- The theoretical basis of crystal structures of devices for processing signals
- Investigation of precision ultra-sensitive fiber-optical accelerometers.
- Study of medical and engineering principles for the creation of medical information-diagnostic systems of millimeter range
- The formation of surface layers by ion implantation
- Compression of speech signals based on transforms with an adaptive selection of the coefficients
- Radiometry and microwave measurements of weak signals. Study of interaction of electromagnetic fields with physical and biological objects
- Research of processes of interaction of laser radiation with biological objects for diagnostics of oncological diseases
- Study of the effect of microwave radiation on biological objects and parameters of solutions
- Study of ultrasonic atomization of liquids. Non-destructive ultrasonic testing

5. INTERNATIONAL COLLABORATION

Faculty of Radio Engineering participate in international cooperation within the framework of partnership agreements, cooperation, and scientific exchange with the following countries:

- Chech Republic
- People's Republic of China
- Germany
- USA
- Austria
- Switzerland
- Great Britain
- Canada
- Turkey

To ensure the quality of the educational process, the Department of Radio Receiving and Processing of Signals has contracted with EDAis Ltd and Cadence Design Systems Inc to obtain licensed OrCAD software packages.

The Faculty cooperates with the following organizations: MikroTik, Nuvoton, Wurth Elektronik.

In 2015-2019, the faculty developed a prototype of a compact portable system of prevention and counteraction in the detection of hidden weapons (knives, pistols, and grenades) on the human body under the program "Science for Peace and Security" (NATO grant)

A cooperation agreement was concluded with the Prague Technical University (Czech Republic) - Faculty of Electrical Engineering (FEL, ČVUT), according to which the academic mobility of masters and graduate students is carried out.

A cooperation agreement has been concluded within the European Erasmus + program with Queen Mary University of London (London, United Kingdom).

6. CONTACT INFORMATION

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