

"...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 RADIOENGINEERING

Kyiv, 2018

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**** Information is current as for 2018/2019 academic year. In the next academic year, there may be minor changes in the list of training specialties and specializations.*



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1. COMMON DESCRIPTION AND STRUCTURE OF FACULTY



Faculty of Radioengineering (FR) was established on the basis of the radio laboratory of the electrical engineering faculty of Kyiv Polytechnic Institute, founded by V.V. Ohiyevskiy in 1921. In 1928 was the first graduation of electric engineers in radio specialty. In 1930 the faculty of electrical engineering was separated and reorganized into Kyiv Power Engineering Institute, in which the radiotechnical 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 Radioengineering faculty of the Igor Sikorsky KPI. The regular graduation of radioengineers has started since 1931.

Structure

Faculty of Radioengineering consists of 4 departments:
The department of theoretical foundations of radio, The department of radio reception and signal processing, The department of radio engineering devices and systems, The department of radio design and electronic radio equipment manufacture.

1. The department of theoretical foundations of radio trains highly qualified specialists with a degree in "Telecommunications and Radioengineering" (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. The department of radio engineering devices and systems prepares highly qualified specialists with a degree in "Telecommunications and Radio Engineering" (specialization "Radio-technical Information Technologies"). Students learn in-depth information transmission theory, in which we consider systems of



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modern television, 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. The department of radio reception and signal processing prepares highly



qualified specialists in the specialty "Telecommunications and Radioengineering" and specialization "Radio Communication and Signal Processing". 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.

4. The department of radio design and electronic radio equipment manufacturing prepares highly qualified specialists in the specialty "Telecommunications and Radioengineering" and 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.



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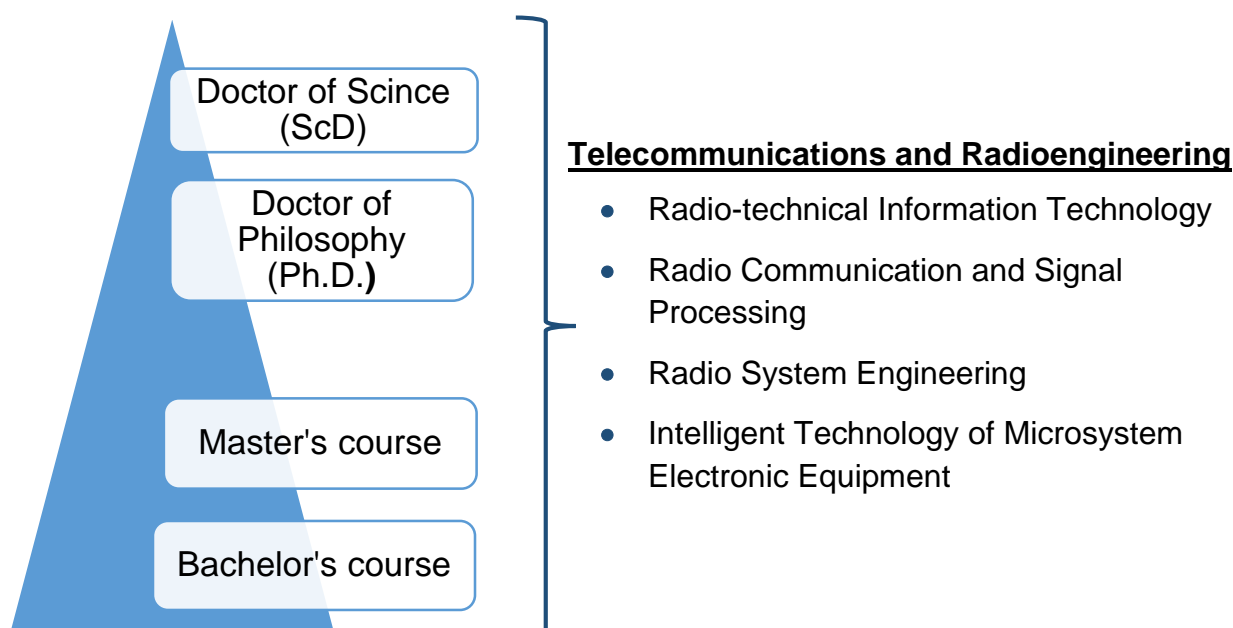
2. EDUCATIONAL PROGRAMS

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 IV year, they defend bachelor's thesis and obtain Bachelor's qualification degree. At the second level (Master's course, V – VI years) training is carried out according to the Master 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 at Bachelor's course and Master's course), Graduate course / Doctoral candidacy – 3 years (4 years by the correspondence study).

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

Specialties and specializations of training:



Faculty of Radioengineering 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-



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Радіотехнічний
факультет

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 Radioengineering successfully 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, KGTRK and others; in research institutes and various medical institutions of Ukraine. Traditionally, our graduates interested SBU SVRU, Interior Ministry, State Customs Service and other government agencies that have special departments of technical control and maintenance. Most graduates work in foreign companies and their Ukrainian representative offices: Ericsson, Melexis, Luxsoft, Infineon Technologies, National Instruments, Cisco Systems, and others.

3. TRAINING AND LABORATORY BASE

At the Faculty students study in their own 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.

The Faculty of
Radioengineering has
specialized laboratories

At the *Department of theoretical foundations of radio engineering* there are the following laboratories:

1. Laboratory 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



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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 microwave devices
3. Laboratory power supplies
4. Laboratory elements and devices of the microwave
5. Laboratory of basics of television devices and systems
6. Laboratory transmitters
7. Laboratory of computing techniques
8. Laboratory components and microelectronics

At the **Department of radio reception and signal processing** 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 radio reception and signal processing** 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



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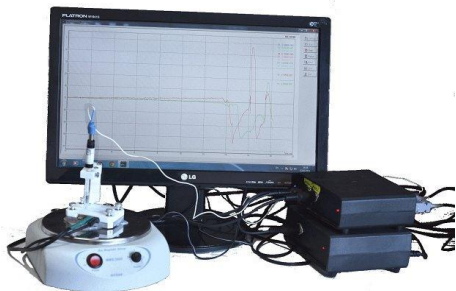
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4. RESEARCH ACTIVITY

Scientific directions of the *Department of theoretical foundations of radio engineering*:

- Theory and technique: 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



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 simulation of devices

Scientific directions of the *Department of radio reception and signal processing*:

- 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.
- Research and development of telecommunication systems of nanosatellites.
- Physics and technique of power ultrasound.



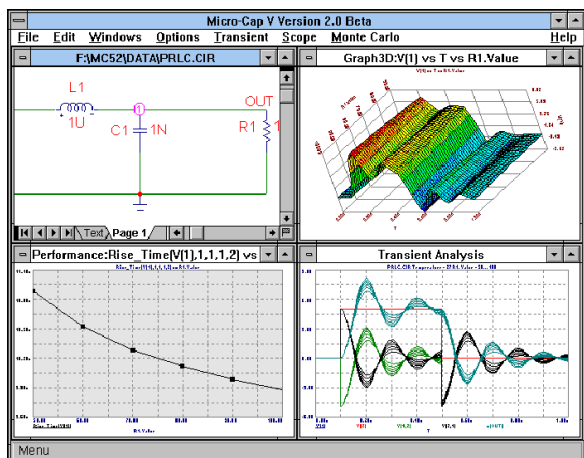
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- Radio engineering devices and systems for the Internet of things (Internet of Things, IoT).
- Creation of means of digital communication.

Scientific directions of the *Department of radio design and electronic radio equipment manufacturing:*



- 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
- 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



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5. INTERNATIONAL COLLABORATION

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

- ✓ Germany
- ✓ France
- ✓ USA
- ✓ Austria
- ✓ Switzerland
- ✓ Great Britain
- ✓ Greece
- ✓ Canada
- ✓ Turkey

In July 2015, grant to perform work jointly with Canada on the project "Long-Range Stand-off Microwave radar for Personnel Protection" was obtained by the order of NATO for a period of 3 years with a total funding of 200 000 €.

To ensure the quality of the educational process of the Department of radio reception and signal processing, an agreement was concluded with companies EDAis Ltd and Cadence Design Systems Inc in order to obtain the license of the software package OrCAD.

The faculty collaborates with such organizations as MikroTik, Nuvoton, Wurth Elektronik.



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