

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



INFORMATION PACKAGE

RADIO ENGINEERING FACULTY

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.**



Foreign Economic Activity Office
тел. +38044 204 83 81
forea@kpi.ua
forea.kpi.ua/

Faculty of Radio Engineering
тел. +38 097 165 98 56; +38 044 204 92 93
rtf@kpi.ua
rtf.kpi.ua



1. COMMON DESCRIPTION OF THE FACULTY

Radio Engineering Faculty (REF) 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 **Radio**

Engineering Faculty of the Igor Sikorsky KPI. The regular graduation of radio engineers has started in 1931.

Radio Engineering Faculty 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 **Radio Engineering Faculty** 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.



2. STRUCTURE

Radio Engineering Faculty consists of 3 departments:

- Department of Radioengineering;
- Department of Radiotechnical Systems;
- Department of Applied Radioelectronics,

and

- Educational and Scientific Laboratory “KPI-QualiTech”.

3. EDUCATIONAL PROGRAMS

Levels of higher education. Training of students at the REF is carried out 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; Doctorate – 2 years.

1. Department of Radioengineering provides training under the following Educational Programs:

Specialty	Educational Program	Levels of higher education		
		First	Second	Third
Telecommunications and Radio Engineering	Information and Communication Radioengineering	Bachelor <i>EPP</i>	Master <i>EPP</i>	–
			Master <i>ESP</i>	–
	Telecommunications and Radio Engineering	–	–	PhD <i>ESP</i>

Comment: *EPP* – Educational-Professional Program

ESP – Educational-Scientific Program



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Students in-depth study theory of electronic circuits, theory of signals and processes of electronic devices and systems, theory of processing analog and digital signals, fundamental course of Electrodynamics and Radio Wave Propagation, theoretical bases and methods of engineering implementation of radiation devices, receiving and space-time processing of information in the radio, telecommunications, and medical systems, design of smart antenna systems for various purposes.



2. Department of Radiotechnical Systems provides training under the following Educational Programs:

Specialty	Educational Program	Levels of higher education		
		First	Second	Third
Telecommunications and Radio Engineering	Information and Communication	Bachelor <i>EPP</i>	Master <i>EPP</i>	–
	Telecommunications Radioengineering		Master <i>ESP</i>	–
	Telecommunications and Radio Engineering	–	–	PhD <i>ESP</i>

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

Students in-depth learn information transmission theory, in which one considers systems of modern television, mobile communication systems 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's 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.



Students also 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



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rtf.kpi.ua



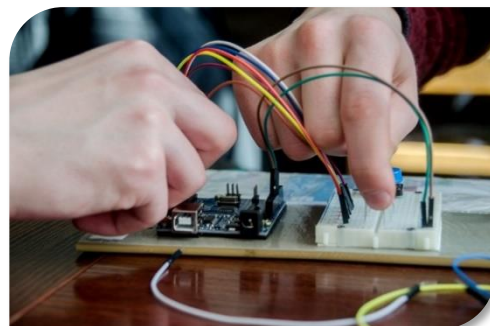
identification, recognition, and restoration of signals and images; sophisticated digital filtering algorithms; artificial intelligence systems and neural networks in signal processing.

3. Department of Applied Radioelectronics provides training under the following Educational Programs:

Specialty	Educational Program	Levels of higher education		
		First	Second	Third
Telecommunications and Radio Engineering	Intelligent Technologies of Radioelectronic Equipment	Bachelor <i>EPP</i>	Master <i>EPP</i>	–
			Master <i>ESP</i>	–
	Telecommunications and Radio Engineering	–	–	PhD <i>ESP</i>

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

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.



1. 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.



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4. TRAINING AND LABORATORY BASE

Radio Engineering Faculty is housed in a separate 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 Radiotechnical Faculty there are specialized laboratories

At the **Department of Radioengineering** there are the following laboratories:

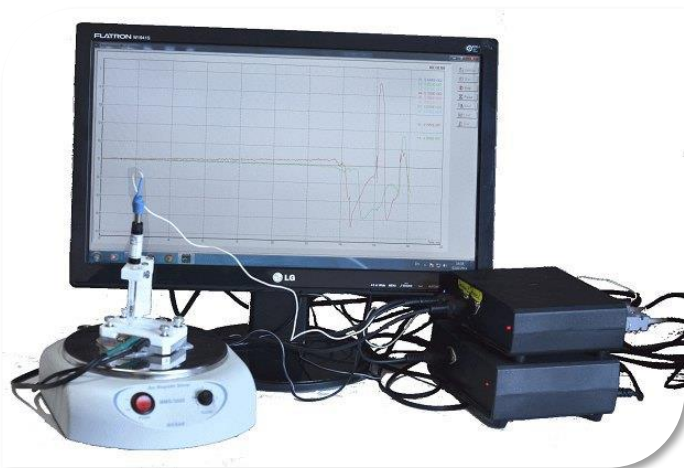
- Laboratory of microwave devices
- Laboratory of computer modeling
- Laboratory of basics of electronics
- Laboratory of RF circuits and signals
- Laboratory of electrodynamics
- Laboratory of antenna technology
- Laboratory medical equipment
- Laboratory of radio measurements
- Laboratory of satellite information systems
- Training laboratory of digital television
- Computer class radio-electronic and computer tools for creating multimedia
- Computer class software development of electronic equipment
- Laboratory of digital devices
- Laboratory design of electronic equipment
- Laboratory of radio receivers and analog circuitry

At the **Department of Radiotechnical Systems** there are the following laboratories:

- Laboratory of systems of radiolocation and radio navigation
- Laboratory of microwave devices
- Laboratory of power supplies
- Laboratory of elements and microwave devices
- Laboratory of basics of television devices and systems
- Laboratory of transmitters
- Laboratory of computing techniques
- Laboratory of components and microelectronics
- Laboratory of digital signal processing and programmable logic integrated circuits.



At the **Department of Applied Radioelectronics** there are the following laboratories:



- Laboratory of medical electronic industry
- Laboratory of computer design
- Laboratory radio design
- Educational technology laboratory
- The laboratory of audiovisual teaching methods
- Educational-scientific laboratory of microwave radiometry, and measurements of microwave signals
- Laboratory of microelectronics and microsystem technology

5. RESEARCH ACTIVITY

Scientific fields of the **Department of Radioengineering**:

- 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
- 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.



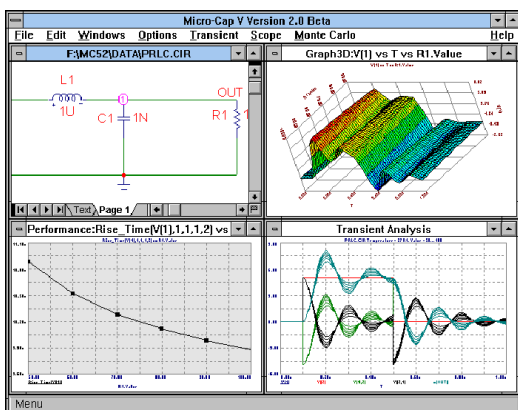
- Devices and systems for HF and microwave telecommunication, information security, process measurements.
- Development and research of the telecommunication systems of nanosatellites.
- Physics and technique of power ultrasound.
- Radio engineering devices and systems for the Internet of Things (IoT).
- Creation of means of digital communication.

Scientific fields of the **Department of Radiotechnical 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 fields of the **Department of Applied Electronics:**

- 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

6. INTERNATIONAL COLLABORATION

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

- Czech 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 Radiotechnical Systems** has contracted with EDAs Ltd and Cadence Design Systems Inc to obtain licensed OrCAD software packages.

The Faculty cooperates with the following organizations: MikroTik, Nuvoton, Würth 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).



7. CONTACT INFORMATION

1. Dean: PhD, Assoc. Prof., Ruslan V. Antipenko

Address: Ed. Build.No17, 12, Polytechnichna Str., Kyiv, Ukraine, 03056

Phone:+380-44-204-92-93, +380-44-362-83-42

e-mail: r_anti@ukr.net, rtf@kpi.ua

Official website: rtf.kpi.ua

2. Department of Radioengineering

Acting Head of Department:

PhD in Technics, Assoc.Prof., Sergii E. Martyniuk

Phone: +380-44-204-93-92, +380-44-204-83-41

Official website: ri.kpi.ua

3. Department of Radiotechnical Systems

Head of Department:

Doctor of Technical Sciences, Prof., Sergii Ya. Zhuk

Phone: +380-44-204-92-97

Official website: rts.kpi.ua

4. Department of Applied Radioelectronics

Acting Head of Department:

Doctor of Technical Sciences, Prof., Oleksander Ya. Stepanov

Phones: +380-44-204-94-20, +380-44-204-94-23;

Official website: re.kpi.ua



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тел. +38044 204 83 81

forea@kpi.ua

forea.kpi.ua/

Faculty of Radio Eengineering

тел. +38 097 165 98 56; +38 044 204 92 93

rtf@kpi.ua

rtf.kpi.ua

