"...the development and maintenance of modern instruments and systems: the measuring equipment of onboard complexes, diagnostic complexes of medical and general purposes, controlling devices for energy-saving systems..."

INFORMATION PACKAGE

FACULTY OF INSTRUMENTATION ENGINEERING

Kyiv, 2016

CONTENT

****The information is current as for 2016/2017 academic year. In the next academic year, there may be minor changes in the list of training directions, specialties, and specializations.*

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1. COMMON DESCRIPTION AND STRUCTURE OF FACULTY

Faculty of Instrumentation Engineering provides training in the development and maintenance of modern instruments and systems for various applications: measuring equipment of onboard complexes, diagnostic complexes of medical and general purpose, controlling devices for energy-saving systems.

Students acquire extensive knowledge and skills in the use of modern methods of construction of high-precision devices with the use of a microprocessor and computer technology, computer-aided design, and computer graphics.

Structure

The Faculty of Instrumentation Engineering includes 6 departments.

1. Department of Instrument Making trains specialists with a degree in "Automation and Computer Integrated Technologies" (specialization "Computer-integrated Systems and Technologies of Fine Mechanics"), and in "Metrology and Information and Measuring Equipment" (specialization "Information-measuring Systems and Technologies of Fine Mechanics").

The purpose of the training course is acquiring new information technology by future professionals, their studying of modern computer-aided design (CAD, CAE, CAM, CAD "Catia", etc.), as well as obtaining the necessary knowledge to develop computer-measuring complexes (including the energy saving industry).

2. Department of Instrumentation Design and Engineering trains specialists with a degree in "Automation and Computer Integrated Technologies" (specialization "Computer-integrated Technologies of Devices Manufacturing), and in "Metrology and Information and Measuring Equipment" (specialization "Biomedical measuring Equipment").

Specialization "Computer-integrated Technologies of Devices Manufacturing " is the latest trend of high-tech, which uses the latest advances in the field of computer

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and information tools, artificial intelligence, control theory, microprocessor technology, electronics and automation elements of design and manufacturing processes.

Specialization "Biomedical measuring equipment" is a multi-direction of modern medical and biological technologies based on the latest achievements of medicine and technology and is intended for the design, manufacture, and service of biomedical devices and information-measuring systems.

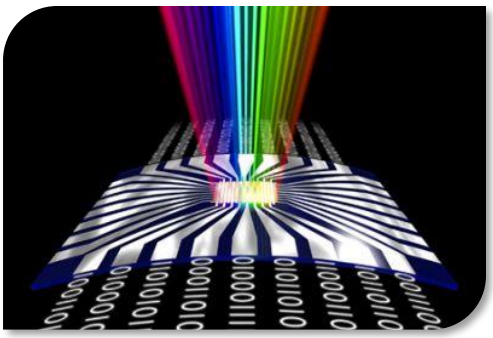
3. Department of Orientation and Navigation Instruments and Systems

trains specialists with a degree in "Automation and Computer-Integrated Technologies" (specialization "Computer-integrated Technologies and Navigation and Control Systems."

The main areas of training include the development and implementation of computer technology in the design of orientation, navigation and traffic management, technical and medical diagnostic systems; design of devices and systems for measuring and recording the parameters of motion of physical and biological objects.

During the course, students acquire knowledge of computer technologies, systems CAE-CAD (AutoCAD, SolldWorks, Nastran, Compass), programs for the development of electronic circuits (MicroCAP, LabVIEW), programming languages (Delphi, C ++), systems of mathematical modeling (Matlab, MathCAD), Web-based design. The department has its own computer center and modern laboratories in the core disciplines.

4. Department of Optical and Optoelectronic Instruments



trains specialists with a degree in "Metrology and Information and Measuring Equipment" (specializations "Optoelectronic Information-Measuring Systems and Technologies" and "Photonics and Optical Informatics".

Studying in the Igor Sikorsky KPI is a unique possibility of obtaining the state diploma of an educational institution of the highest level of accreditation in the field of applied engineering of optical technologies in Ukraine.

The Department opened the French-Ukrainian master's program with a double diploma of the Igor Sikorsky KPI in the field "Photonics and Optical informatics". There is also a specialty "Physics. Photonics and optical engineering" opened in cooperation with the University of Le-Mann. Students participating in the program receive financial support from the Embassy of France in Ukraine.

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5. Department of Non-Destructive Testing Instruments and

trains specialists with a degree in "Automation and Computer-integrated Technologies" (specialization "Computer-integrated Technologies and Systems of Nondestructive Control and Diagnostics").

The main direction of educational work is the training of self-sufficient specialists in the design and operation of systems of nondestructive control of constructions materials and technical diagnostics of machinery. At the same time graduates of the Department receive the necessary training to work in the field of medical engineering.

6. Department of Scientific, Analytical and Ecological Instruments and Systems

trains specialists with a degree in "Metrology and Information and Measuring Equipment" (specialization "Information-measuring Systems and Technologies for Environmental Monitoring".

The basis of the professional component of the department curriculum is formed by such disciplines as analytical environmental equipment, environmental monitoring systems, measurements of parameters of equipment protection, radiation measurement devices, quality control devices of food, information technology, environmental, technological and environmental monitoring, environmental security, environmental audit, ecology sustainable development, metrological support of analytical instruments, instrumentation logistics.

The Faculty graduates work at instrument design enterprises of air and space profile, enterprises of energy saving technologies implementation; enterprises of designing and implementation of modern medical and diagnostic, training and treatment complexes; and also at transport and printing enterprises.

2. EDUCATIONAL PROGRAMS

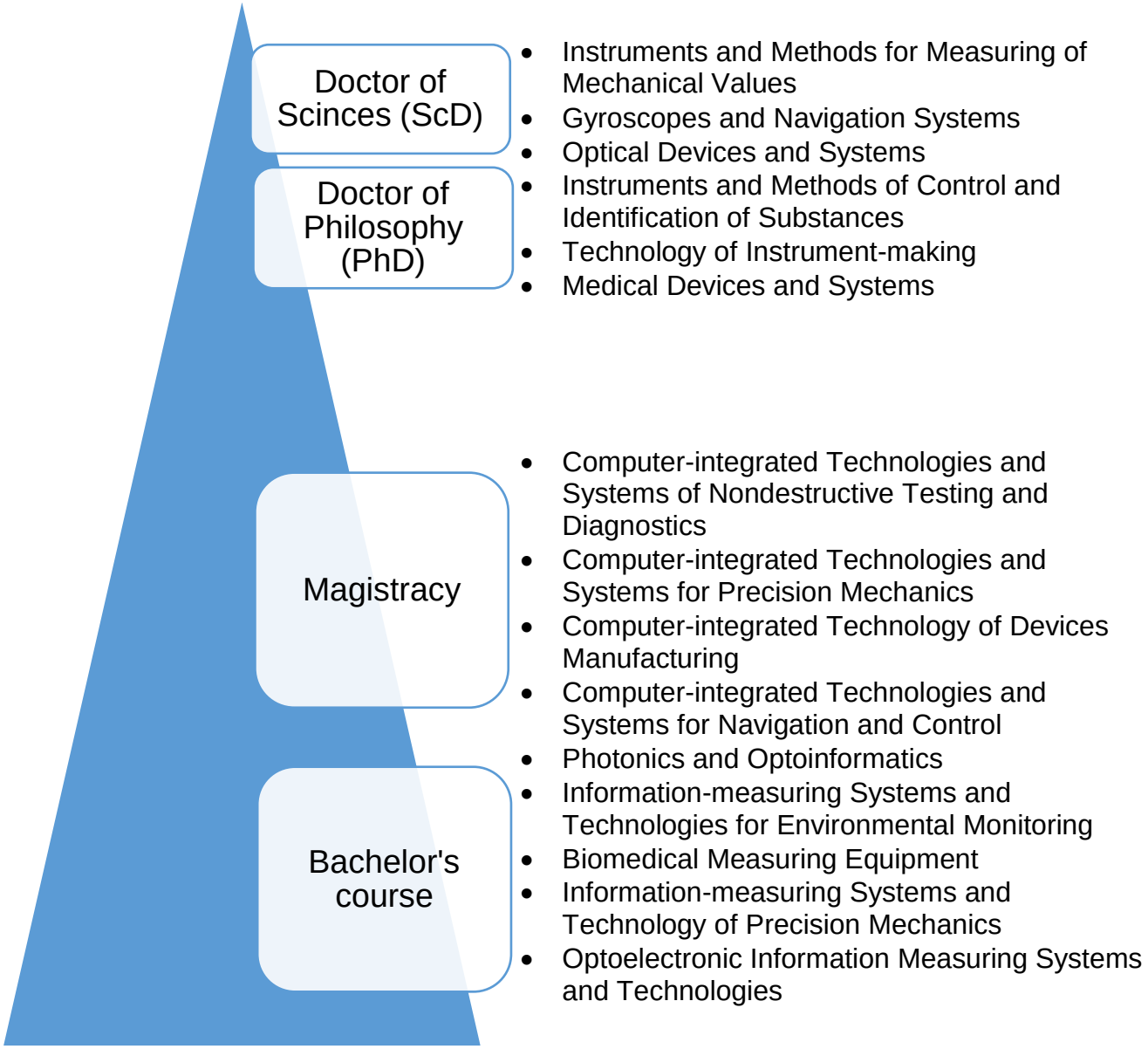
Levels of higher education. Training of students at the FCT is carried out at several levels of higher education. At the first level (Bachelor's, I – IV years) the students acquire fundamental knowledge in physics, mathematics, mechanics, computer engineering, and special disciplines. During the IV year, they defend bachelor course work and receive Bachelor's qualification degree. At the second level (Magistracy, 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 course and Magistracy), 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.

Areas and specialties of students training at the FIE:



- Instruments and Methods for Measuring of Mechanical Values
- Gyroscopes and Navigation Systems
- Optical Devices and Systems
- Instruments and Methods of Control and Identification of Substances
- Technology of Instrument-making
- Medical Devices and Systems
- Computer-integrated Technologies and Systems of Nondestructive Testing and Diagnostics
- Computer-integrated Technologies and Systems for Precision Mechanics
- Computer-integrated Technology of Devices Manufacturing
- Computer-integrated Technologies and Systems for Navigation and Control
- Photonics and Optoinformatics
- Information-measuring Systems and Technologies for Environmental Monitoring
- Biomedical Measuring Equipment
- Information-measuring Systems and Technology of Precision Mechanics
- Optoelectronic Information Measuring Systems and Technologies

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3. TRAINING AND LABORATORY BASE

Department of Instrument making has 5 specialized training laboratories:

- laboratory of Microprocessor engineering and computer measurement systems;
- laboratory of Computer technology;
- laboratory of Conversion devices;
- laboratory of Elements of devices and tools for measuring motion parameters;
- laboratory of Flow measuring instruments;
- laboratory of Means of measuring in the energy-saving systems.

Department of Instrumentation Design and Engineering. Students have at their disposal well-equipped training department laboratories:

- Physical principals of material processing;
- Technology of device components;
- Testing of devices;
- Automation of industrial processes;
- Flexible manufacturing systems and industrial complexes;
- Optoelectronic methods of monitoring and measurement;
- Biometrics and medical devices;
- Computing technique.

At the **Department of instruments and systems of orientation and navigation** there are four training laboratories:

- Computer Technologies (PC training class);
- Design elements and units of devices and systems;
- Gyroscopic and navigation equipment and systems;
- Automatic control systems of mobile units.

In order to carry out educational process on the specialty the **Department of optical and optical-electronic devices** is equipped with the following laboratories and classrooms:

- "Wave optics" laboratory.
- "Applied optics" laboratory.
- "Optoelectronic devices" laboratory.
- "Optical and optoelectronic system testing" laboratory.
- "Optical measurements" laboratory.
- "PC classrooms".

In the lab course "Optical measurements" a research group of photometric studies operates, where the research work is carried out by students of the Department on the subject of "Methods, means and metrological assurance of measuring energy characteristics of multielement detectors and devices on their basis".

During the teaching process **applications**, which are specially designed at the Department, are used:

- "Aber" - for computer-aided design of optical systems;
- "Ray" - for aberration analysis of optical systems;
- "VARIO" - for calculating the two-dimensional and three-lens, mirror and mirror-lens optical systems of zoom with optical image plane shift compensation;
- "Condenser" - for the calculation of one-, two- and three-lens condenser;
- "ASOC" - for aberration synthesis one-, two- and three-lens glued and unglued optical components;
- "Radius" - to find the default values of the radii of the spherical surfaces of optical components;
- "Body" - for calculating the dimensional telephoto lenses, etc.

Software and technical support of the educational process of the **Department of Non-Destructive Testing Instruments and Systems.** The students acquire knowledge and skills to work with different software products for designing better devices and non-destructive testing systems.

At the Department they learn:

- MatLab&Simulink – simulation of mathematical models and processes;
- MathCAD – mathematical calculations;
- LabVIEW – development environment and platform for running programs created in the graphical programming language "G";
- PCAD – development of electrical circuit boards for automated systems;
- C++ is a programming language;

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- FemLab – modeling of thermal and electromagnetic processes.

Mastering of the material takes place in the laboratories of the Department:

- laboratory of Informatics and Computer Science;
- laboratory of NC solenoid and electronics;
- laboratory of Optical NDT methods;
- laboratory of Thermal NDT methods;
- laboratory of Acoustic NDT methods.

4. RESEARCH ACTIVITY

Department of Instrument Making performs research activities in the following directions:

- multi-axis transducers of mechanical quantities;
- generalization and development of theory and experimental basis of the creation of gravimetric measuring instruments;
- instruments and methods for measuring pressure;
- devices and methods of energy saving;
- precision mechanical systems and medical devices;
- development of sensors and transducers of physical quantities and their components for the measurement, monitoring, control and diagnostics.
- improving the accuracy and reliability of devices and systems;
- algorithmic methods of devices and systems;
- microprocessor technology and information systems;
- mechanics of elastic elements of the devices and systems;
- the modern system of shock and vibration protection high-precision devices of the aircraft;
- gravimetric techniques and instruments of measurement;
- CAD / CAE are the technologies for the development of measurement instruments.

The main scientific directions of the ***Department of Instrumentation Design and Engineering:***

- mathematical modeling techniques and the study of physical processes processing of materials in a modern instrument-making industry;
- the creation of intelligent systems production instrument;
- computer preparation of production devices;

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- the creation of laser optical-electronic, vibroacoustic and electromagnetic diagnostic systems, monitoring and quality control of the production equipment;
- study of the influence of laser and acoustic radiation biostructures and creation of medical systems based on it;
- creation of specialized microprocessor systems for dentistry and orthodontics.

Department has three research and teaching areas:

- the study of the physical fundamentals of materials processing and mathematical modeling of processes in the instrument;

- the study of principles of construction of diagnosing the state of process equipment systems, quality monitoring and control products;

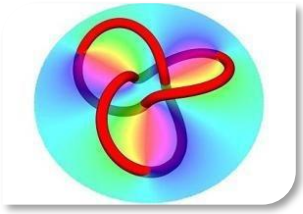
- the study of principles of construction of medical and systems for medical diagnostics based on biophysical interactions in cellular structures of living organisms.

Department of Orientation and Navigation Instruments and Systems performs research activities in the following directions:

- research and development of algorithms and software for information processing, computer-aided design of complex technical systems, which are managed by incomplete and inaccurate information about their condition.
- the creation of a modern element base (solid-state wave gyroscopes, magnetosensitive elements, etc.), systems of orientation, stabilization, and inertial navigation systems, and development of algorithms and software to correct them.
- development of instrumentation and algorithms of control and processing of computerized complexes technical and medical diagnostics.
-

At the ***Department of Optical and Optoelectronic Instruments*** the following developments are being carried out:

- the design of onboard optical-electronic space-based systems;
- ophthalmologic instrument;
- development of optic-electronic devices for the minimally invasive clinical medicine;
- digital optical microscopy;



- methods and tools for the computer-aided design of optical systems;
- singular optics;
- development of instrumentation for the determination of optical instruments and systems performance;
- methods, tools and metrology measurement of the energy characteristics of a lot of elemental detectors.

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Department of Scientific, Analytical and Ecological Instruments and Systems performs research activities in the following directions:

- theory and practice of television pyrometry;
- television information-measuring systems as a highly effective means of control in electron-beam technologies of material processing;
- development of a multi-functional portable instrument for the control of sanitary and ecological characteristics of the environment and workplaces;
- research and development nano clay compositions and connection technologies of precision parts in the instrument;
- study of methods of modeling and optimization of distributed peer-to-peer networks.

Department of Non-Destructive Testing Instruments and Systems performs research activities in the following directions:

- methods of control of the stress state and fatigue of structural materials;
- acoustic and eddy-current flaw mobile detectors;
- ultrasonic methods and devices for the medical diagnostics needs;
- development of precision measuring instruments magnetic and electric fields;
- electrical methods for mineral exploration;
- research and development of a thermal method of non-destructive testing;
- development of techniques to improve the quality of training of specialists in non-destructive testing and technical diagnostics.
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5. INTERNATIONAL PROJECTS AND COLLABORATION

Department of Orientation and Navigation Instruments and Systems supports international scientific relations with the State Scientific Center of the Russian Federation Central Research Institute "Elektropribor" Ramenskoye Design Bureau (Russia), Technical University of Dresden (Germany), the European representative offices of firms "the Altera" and "Texas Instrument" (USA). The department staff took part in scientific conferences of the CIS countries, the USA, England, Germany on automation.

Department of Optical and Optoelectronic Instruments maintains scientific contacts with universities and research companies of Germany (the University of Heidelberg, University of Bremen, Institute for physics Kirchhoff), Mexico (Technical University, Pueblo), China (the Optical center, Juhani), The Netherlands (University of Amsterdam), Belarus (University, Minsk, Belarus).

In 2011 the Department opened the French-Ukrainian master's program of receiving two diplomas: Ukrainian the Igor Sikorsky KPI and the European Universite du Maine on Photonics and optoelectronic instrumentation. The program is open to

graduates of higher educational institutions of Ukraine the qualification of "bachelor" in "optical technology".

Department of Non-Destructive Testing Instruments and Systems is a member of the world Federation of NDT centers and has close relations with universities in the USA and Germany. Scientists of the Department regularly take part in conferences on nondestructive testing held in Ukraine and abroad. Members of the Department presented their reports and at scientific conferences in the U.S.

The Department collaborates with:

- UniversitätWürzburg/ University, Wurzburg (Germany) in the direction of nuclear magnetic resonance, magnetic resonance imaging.
- FederalInstituteForMaterialsResearchandtesting / Federal Institute for Research and Testing of Materials, Berlin, Germany) in the simulation of the processes during the radiographic testing of materials.

6. CONTACT INFORMATION

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