

"Biomedical engineering is an interdisciplinary field of science and engineering, which combines engineering and life sciences. The goal of biomedical engineering is to solve problems arising in the study of living objects, with the help of engineering methods and principles."



INFORMATION PACKAGE

**FACULTY OF BIOMEDICAL  
ENGINEERING**

**Kyiv, 2020**

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***\*\*\*The 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

The biomedical engineering industry is growing rapidly and is one of the most promising areas of engineering future. Biomedical Engineering opens new opportunities for career growth and professional development.



Biomedical Engineering opens new opportunities for career growth and professional development. **Department of Biomedical Engineering (FBME)** - one of the newest faculties of Igor Sikorsky KPI - arose in response to the challenge of the time.

The Faculty trains specialists in the modern sections of Biomedical Engineering, Medical and Biological Informatics and Cybernetics, Physical Rehabilitation. Students are trained at FBMI by about 130 highly qualified teaching staff and leading scientists of the National Academy of Sciences and the National Academy of Medical Sciences of Ukraine, including 2 professors are honored workers of science and technology of Ukraine, 15 doctors of sciences, 20 Ph.D.

**FBME** students undergoing practical training at the leading research institutions, clinical hospitals and manufacturing plants in Ukraine and abroad. The faculty graduates work both in Ukraine and abroad, they hold positions of leading specialists - biomedical engineers, software developers, and scientists.

**Structure.** The faculty consists of 6 departments, 4 of them are producing departments.

**1. Department of Biomedical Engineering** trains bachelors, masters, and doctors of sciences of the highest qualification in the field of "Biomedical engineering" (educational program/specialization "Medical engineering")



Students' training on "Biomedical engineering" is aimed at obtaining engineering and technical knowledge, skills, and abilities to create tools and methods, improvement and research natural and artificial biological objects, machinery, materials, and medical products, technologies and technical systems for diagnostics, treatment, rehabilitation and prevention of human diseases, as well as software and information technologies for solving applied and fundamental problems of biology and medicine.



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## 2. Department of Biomedical Cybernetics

trains professionals in "Computer science" (educational program/specialization "Information technologies in biology and medicine").



The Department trains specialists competent in the design, development, and practical application of medical information systems; medical robotics and nanotechnology; medical systems for diagnostics and monitoring condition of the body; medical Cybernetics and simulation; telemedicine.

## 3. Department of Human Biosecurity and Health

prepares experts in specialties "Physical therapy, ergotherapy" (educational program/specialization "Physical therapy").

Training is provided at the junction of such areas as biomedical engineering, instrumentation, and computer science. As technology and Biosafety, bioengineering and restoration are based on the application of engineering principles for the study and development of medical technology, pharmacology, nanotechnology, etc. Regenerative Bioengineering applies the principles of cell transplantation, materials science, biochemistry, bio-Informatics, and biomedical engineering to construct biological substitutes that restore and maintain normal function in diseased and damaged tissues.



The combined use of technologies of regenerative bioengineering and Biosafety offers new treatment methods for patients with injuries and those who require replacement of certain organs and tissues on an artificial as well as for patients with other clinical problems.

## 4. Department of Translational Medical Bioengineering

prepares specialists in the specialty "Biomedical Engineering" (educational program/specialization "Regenerative and Biopharmaceutical Engineering").



Department of Translational Medical Bioengineering was created in 2018.

The direction of the department is the engineering and technological foundations of translational medicine - a modern field, which ensures the rapid introduction (translation) of fundamental discoveries in the field of natural sciences into the practice of health care.



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Regenerative medicine aims at repairing diseased or damaged (injured) tissue using cell therapy methods.

Biopharmaceutical engineering is an interdisciplinary scientific and technical field, aimed at the development and production of therapeutic, prophylactic, and diagnostic products (preparations) of biological origin (vaccines, blood, and its components, allergens, gene therapeutic constructs, tissues, recombinant proteins, living clinical cells ).

The educational process and scientific development are provided by highly qualified staff, including 6 persons of the teaching staff (one professor, three associate professors, a senior teacher, and an assistant).

The educational program contains a wide range of disciplines that are necessary for the development and implementation of modern biomedical technologies and which form the following competencies for students:

- Understanding, ability to analyze, and manage biological processes (biological disciplines).
- Understanding of the pathological and physiological processes in the human or animal body (medical disciplines).
- Understanding, ability to organize and manage technological processes with the participation of biological objects (technological disciplines).
- Ability to create and choose engineering and hardware design of technologies, including using software (engineering disciplines).
- Ability to create and implement technological and engineering solutions, taking into account the legal requirements for the quality, safety and efficiency of bioproducts and technologies, as well as the rules of bioethics and biosafety (regulatory and policy disciplines).

**5. Department of Physical Education** is a University-wide Department and conducts practical training and lecture courses in physical education for students of all the faculties of Igor Sikorsky KPI.



The purpose of the Department includes the development of new educational technologies to improve the educational process in physical education, monitoring of the functional state and health of students and teachers of Igor Sikorsky KPI, the upbringing of healthy and comprehensively developed experts, organizing and conducting classes in physical education,



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exercise and sports perfection of students of the University, preparation for competitions at various levels.

6. The primary tasks of the **Department of Sports Improvement** as a University-wide unit is to provide the educational process of physical education for students of the main educational department and to conduct section training sessions for students of the sports educational department for the formation of university teams.

Sectional training sessions are conducted in football, basketball, volleyball, sports aerobics, and fitness, athletics, swimming, wrestling, boxing and kickboxing, weightlifting, arm wrestling, archery, rowing, kayaking and canoeing, triathlon, chess, water polo. During the period of existence of the department, the teaching, and educational work has acquired a qualitatively new level, which reflects by the achievements of the leading university athletes.



## 2. EDUCATIONAL PROGRAMS

**Levels of higher education.** Training of students at the **FBME** 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 the bachelor's thesis and receive Bachelor's qualification degree. At the second level, (Master's course, I-II years) training is carried out according to the Master program. Students 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).

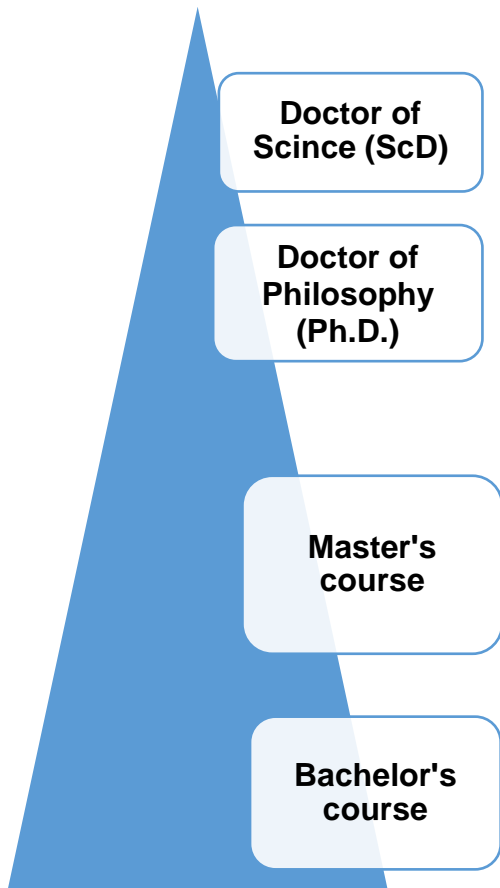


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## Specialties and educational programs/specializations:



### Computer Science

### Biomedical Engineering

### Physical Therapy, Ergotherapy

### Computer Science

- Information Technologies in Biology and Medicine

### Biomedical Engineering

- Medical Engineering
- Regenerative and Biopharmaceutical Engineering

### Physical Therapy, Ergotherapy

- Physical Therapy

## 3. TRAINING AND LABORATORY BASE

The faculty is equipped with modern **laboratory facilities**:

- Scientific and technological laboratory for the development of medical devices and systems. The main tasks of the laboratory are the development of software and hardware, medical devices, technology software development, development and adaptation of software, conducting research, providing conditions for mastering practical skills.
- Lab of Web design and Web technologies. Its basic functions are providing the opportunity for students to master their skills on the practical application of acquired knowledge on the subject "WEB technologies and WEB-design", conducting scientific research in computer science, biomedical engineering and life sciences, development of information systems and web applications.



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- Interdepartmental laboratory of functional reserves of the human body. Laboratory activities are aimed at practical mastering of knowledge and skills on the determination of physiological parameters of the person, health check student computer programs for determining physiological parameters of a person, conducting the study and physiotherapeutic devices and methods.
- Laboratory of medical microprocessor systems, where training stands allow to explore the development of medical devices and systems based on digital signal processors and tools of the modeling signal.
- Educational scientific medical engineering laboratory.

The bases of the **Department of Biomedical Engineering** are the National Institute of Cardiovascular Surgery of Amosov and modern clinical laboratories of other institutes and centers of the Ministry of Health and NAMS of Ukraine; Institute of Electric of E. A. Paton NAS of Ukraine, Institute of Molecular Biology and Genetics, National Academy of Sciences of Ukraine, Institute of Problems of Materials of Frantsevich NAS of Ukraine, Research and Training Centre of Cardiovascular Engineering Igor Sikorsky KPI, modern laboratories and production facilities.

To provide complex investigations, a laboratory of "Functional diagnostics" operates at the **Department of Physical Education** which hosts the massive studies of teachers and students. The laboratory has developed a means of individual monitoring to assess the dynamics of health status and the width of the regulatory range.

## 4. RESEARCH ACTIVITY

### *The main researching areas of the Faculty:*

1. Biomedical Engineering
2. Biomedical Informatics
3. Life Science
4. Sport Science
5. Rehabilitation Engineering
6. Regenerative Bioengineering
7. Biosafety and Biosecurity Engineering
8. Development and testing of preparations (products) of biotechnological origin with immunomodulatory, regenerative, and nutraceutical properties, as well as the organization of their production.
9. Development, bioanalytical and technological standardization of medical devices for serological diagnostics of infectious and non-communicable diseases.



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## 5. INTERNATIONAL PROJECTS AND COLLABORATION

Faculty of Biomedical Engineering actively develops research partnerships and participates in research projects and performs research themes financed from the state budget of Ukraine, by the order of enterprises and organizations of Ukraine, as well as companies of other countries.



- ► Implementation of projects financed from the state budget of Ukraine.
- ► Implementation of projects in the framework of the Ukrainian-Lithuanian cooperation Program in the field of science, education, and culture.
- ► **FBME** is involved in the project of the 7<sup>th</sup> Framework Program of the European Union ("People").
- ► **FBME** participates in projects of the Erasmus+ program, funded by the European Union.
- ► Participation in the implementation of the joint project with the "Samsung electronics Ukraine company".
- ► **FBME** actively cooperates with the office of the company Materialise, the office of National Instruments, and others.



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