



National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"  
Biomedical Engineering Faculty



# 163 Biomedical Engineering Educational Bachelor's Program "Medical engineering"

**Certified Programs: "Clinical Engineering",  
"Biomedical Information and Engineering Technologies"**

Department of Biomedical Engineering  
of Igor Sikorsky Kyiv Polytechnic Institute

<http://bmi.fbmi.kpi.ua/>





# Focus of Bachelor Specialization (Educational and Professional Program) "Medical engineering"

- **Medical engineering** covers research methods using engineering and technical knowledge, as well as development, production, operation and certification of medical equipment, biomaterials, medical products, software and information support in the field of health care.

<http://bmi.fbmi.kpi.ua/wp-content/uploads/2023/04/163-OPPБ-MI-24.03.2023.pdf>



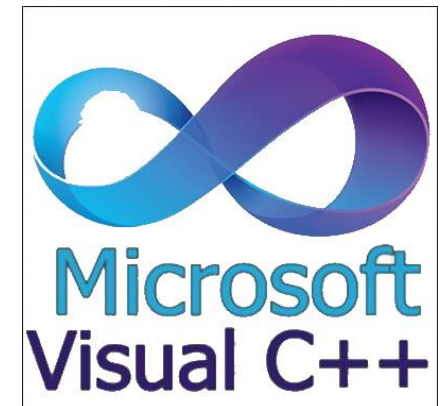


## Professional competences

### for Educational and Professional Program «Medical Engineering»

*The educational program contains regulatory disciplines that form the following competencies to students:*

- Ability to apply engineering software packages for research, analysis, processing and presentation of results, as well as for automated design of medical devices and systems.





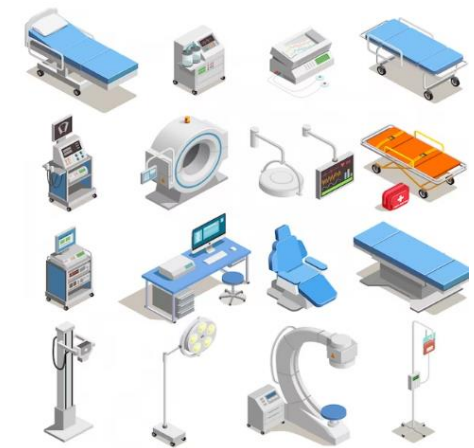
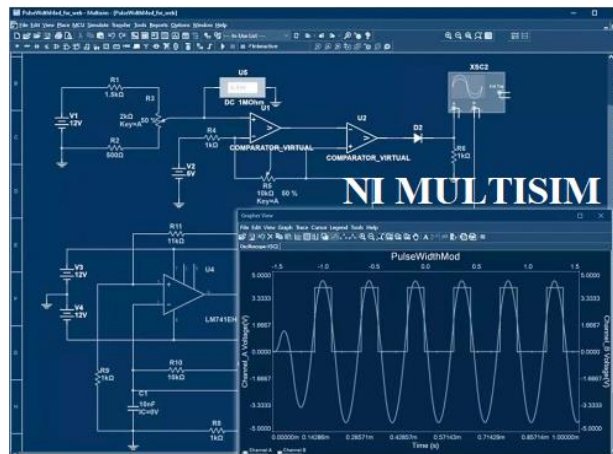
## Professional competences for Educational and Professional Program «Medical Engineering»

*The educational program contains regulatory disciplines that form the following competencies to students:*

- Ability to learn and apply new methods and tools for analysis, modeling, design and optimization of medical devices and systems.



Code Composer Studio



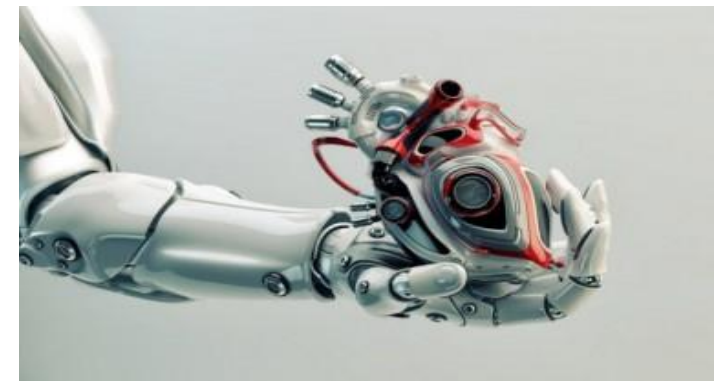
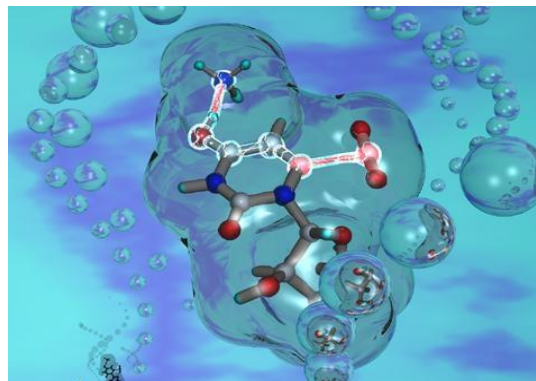


## Professional competences

### for Educational and Professional Program «Medical Engineering»

*The educational program contains regulatory disciplines that form the following competencies to students:*

- Ability to apply physical, chemical, biological and mathematical methods in the analysis and modeling of the functioning of living organisms and biotechnical systems.

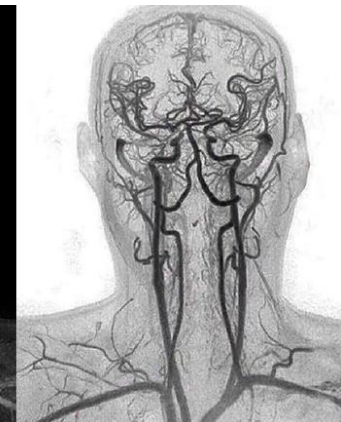
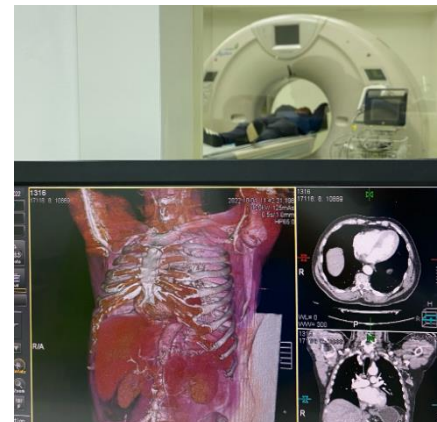
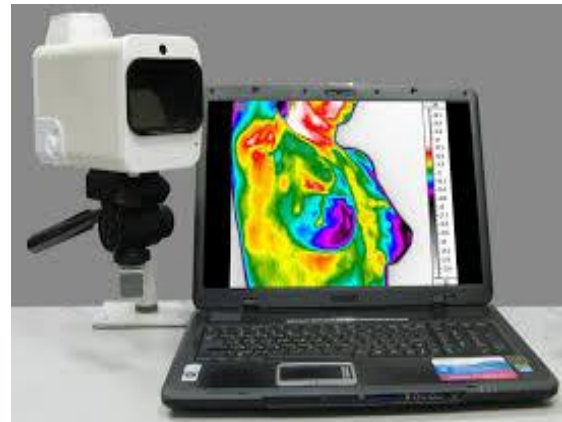




## Professional competences for Educational and Professional Program «Medical Engineering»

*The educational program contains regulatory disciplines that form the following competencies to students:*

- Ability to conduct research and observations on the interaction of biological, natural and artificial systems (prostheses, artificial organs, etc.).

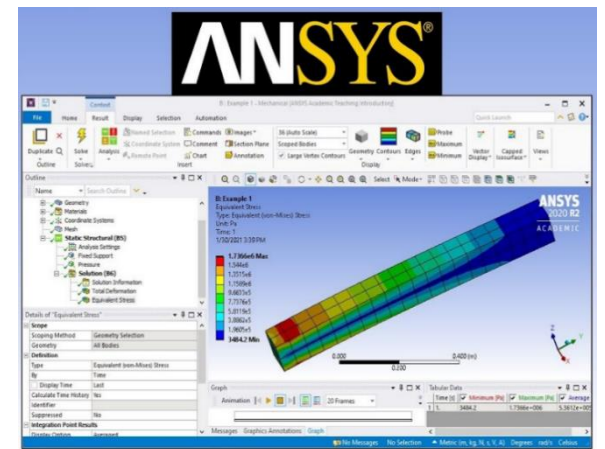
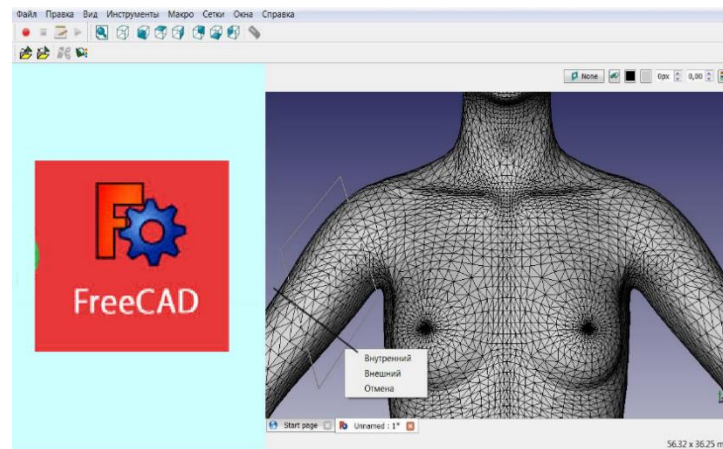
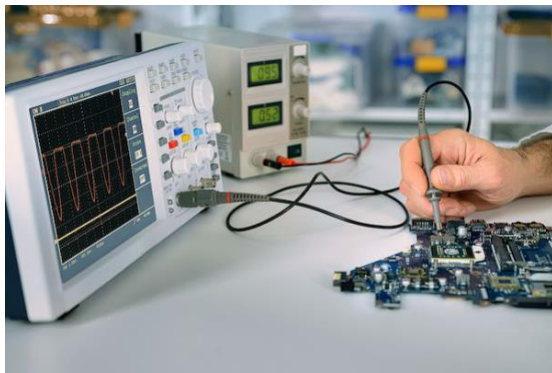




# Professional competences for Educational and Professional Program «Medical Engineering»

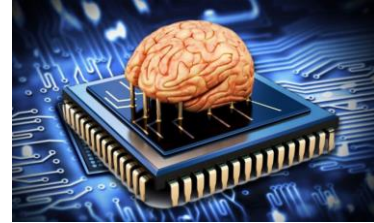
*The educational program contains regulatory disciplines that form the following competencies to students:*

- Ability to apply the principles of building modern automated systems for controlling the production of medical devices, their technical, algorithmic, informational and software support.





## Curriculum: regulatory disciplines (professional training cycle)



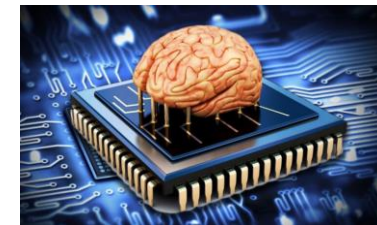
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|--|--|
| – Introduction to Profession   | – Biophysics   |
| – Biochemistry I. Bioorganic Chemistry   | – Mechanics  |
| – Biochemistry II. Biochemistry  | – Object-Oriented Programming (C++)                      |
| – Human Anatomy and Physiology I. Fundamentals of Biomedical Sciences. Medical Terminology | – Radiation Safety and Dozimitriya                       |
| – Human Anatomy and Physiology II. Fundamentals of Human Anatomy and Physiology            | – Analog and Digital Circuitry I. Analog Circuitry       |
| – Material Science and Construction Materials  | – Analog and Digital Circuitry II. Digital Circuitry     |
| – Quantitative Physiology  | – Biomedical Devices, Sets and Systems                   |
| – Fundamentals of Discrete Mathematics   | – Microprocessor Technics                                |
| – Electrical Engineering and Electronics   | – Expertise and Engineering Support of Medical Equipment |
| – Biomaterials and Biocompatibility  | – Control Devices for Human Physiological Parameters     |







## Curriculum: elective disciplines (professional training cycle)



- Biomedical Mechanics
- Registration and Processing of Biosignals and Medical Images
- Telemedicine and Computer Networks
- Automated Design Systems
- Medical Statistics
- Immunology and Allergology
- Biomedical Product Technologies
- Biology of Development and Foundations of Evolutionary Theory
- Measuring Converters and Sensors
- Biomedical Sensor Systems
- Software Engineering in Biomedical Research
- Biothermodynamics and Mass-transfer Theory
- Thermobionics
- Fundamentals of Design and Engineering of Medical Equipment
- Fundamentals of Medical Chemistry and Biopharmacy
- Specialized Equipment in Regenerative and Biopharmaceutical Engineering
- Mathematical Modelling of Biomedical Systems
- Design of Medical Information Systems
- Neural Networks
- Laboratory and Analytical Equipment
- Modern Optoelectronic Diagnostic Devices
- Theory of Inventive Problem Solving
- Therapeutic Medical Equipment
- Development and Operation of Physiotherapeutic Medical Devices
- Methods and Diagnostic Aids of Human Pathology
- Quality Management System in Medicine
- Software Design
- WEB-technology and WEB- design
- Fundamentals of Translational Medicine, Regenerative and Biopharmaceutical Engineering





## Certified Program "**Clinical Engineering**" for Educational and Professional Program «Medical Engineering»



The program "***Clinical engineering***" aims to train specialists based on the deepening of professional competences, abilities and skills that are necessary for a clinical engineer for the effective management of equipment and technologies in a medical institution.

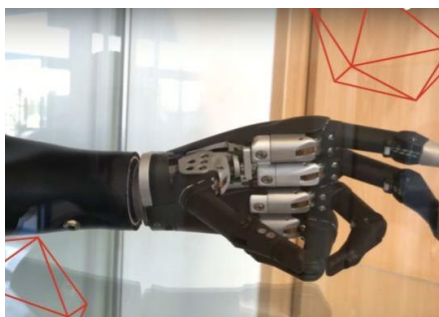
[http://bmi.fbmi.kpi.ua/wp-content/uploads/2022/07/163-SP-ONP\\_Clinical\\_Engineering\\_2022.pdf](http://bmi.fbmi.kpi.ua/wp-content/uploads/2022/07/163-SP-ONP_Clinical_Engineering_2022.pdf)





## Certified program "Clinical Engineering" involves the study of elective subjects

- Registration and Processing of Biosignals and Medical Images
- Biomedical Mechanics
- Automated Design Systems
- Biothermodynamics and Mass-transfer Theory
- Biomedical Sensor Systems
- Laboratory and Analytical Equipment
- Theory of Inventive Problem Solving
- Quality Management System in Medicine
- Therapeutic Medical Equipment





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# Certified Program "**Biomedical Information and Engineering Technologies**" for Educational and Professional Program «Medical Engineering»



The program "***Biomedical information and engineering technologies***" aims to train specialists who are able to apply engineering and information technologies to organize the purchase, installation, operation and service support of medical equipment.

<http://bmi.fbmi.kpi.ua/wp-content/uploads/2023/04/SP-Biomedical-information-and-Engineering-technologies-2023.pdf>

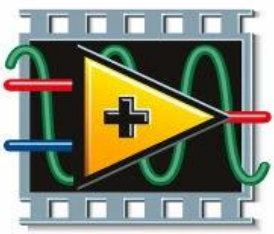


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# Certified program "Biomedical Information and Engineering Technologies" involves the study of elective subjects

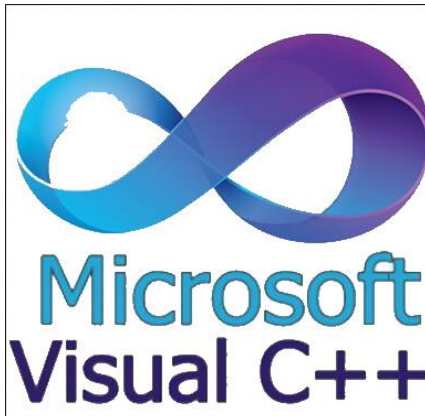
- Telemedicine and Computer Networks
- Medical Statistics
- Software Engineering in Biomedical Research
- Fundamentals of Design and Engineering of Medical Equipment
- Mathematical Modelling of Biomedical Systems
- Design of Medical Information Systems
- Neural Networks
- Software Design
- WEB-technology and WEB- design



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# Preparation for Solving Engineering Problems

Graduates are prepared to solve current problems at enterprises, organizations and institutions engaged in:

- modeling and designing of medical equipment and medical products;
- design of microprocessor and laser systems used in medicine and biology;
- development of special biomedical devices necessary for diagnosis and therapy;
- development and application of constructive biologically compatible materials;
- development of informational medical and diagnostic systems and devices for monitoring human physiological parameters;
- using modern methods and laboratory diagnostic equipment;
- carrying examination and technical support of medical equipment.





# Where can a Biomedical Engineer Work?

Among the medical institutions that need specialists in biomedical engineering, the following can be noted:

- **Clinics, Hospitals, Rehabilitation Centers** - engineering expertise and technical support of medical equipment.
- **Research Institutions** - modeling and design of medical equipment and medical products, development of informational treatment and diagnostic systems, development and application of biologically compatible materials.
- **Diagnostic Centers and Laboratories** - maintenance of medical devices for diagnosis and therapy, use of modern methods and equipment of laboratory diagnostics, technical support of informational medical and diagnostic systems and devices for monitoring physiological parameters of a human.





# The staff of the department (teaching special subjects)

Management of the Department of Biomedical Engineering and

Guarantors of Educational Programs on specialty 163 "Biomedical Engineering":

- **Vladyslav Shlykov**, Associate Professor, Doctor of Technical Sciences, Head of the Department of Biomedical Engineering of Igor Sikorsky Kyiv Polytechnic Institute, guarantor of the educational and scientific program of Doctors of Philosophy (PhD) "Biomedical Engineering";
- **Oksana Biloshytska**, Associate Professor, PhD, Associate Professor of the Department of Biomedical Engineering of Igor Sikorsky Kyiv Polytechnic Institute, Vice Dean of Education, guarantor of the educational and professional program of the first (Bachelor) level of the Higher Education "Medical Engineering";
- **Andriy Solomin**, Associate Professor, PhD, Associate Professor of the Department of Biomedical Engineering of Igor Sikorsky Kyiv Polytechnic Institute, guarantor of the educational and professional program of the second (Master's) level of the Higher Education "Medical Engineering";
- **Larysa Kalashnikova**, Associate Professor, PhD, Associate Professor of the Department of Biomedical Engineering of Igor Sikorsky Kyiv Polytechnic Institute, Deputy Dean of International Cooperation.







## Admission to the Bachelor Degree

- **Foreign citizens who have received a certificate of full secondary education in Ukraine and certificates of foreign language training on the relevant subjects** have the right to enter the first course of all forms of education without an interview on a competitive basis and on the basis of a signed agreement.
- **Admission of foreign citizens for 1 year Igor Sikorsky Kyiv Polytechnic Institute is carried out provided:** availability of full secondary education; successful entrance examination (interviews); university invitation.

**Bachelor Degree (in English):**

<https://istudent.kpi.ua/obuchenie/bakalavrat.html>

**Center for International Education of Igor Sikorsky KPI:**

<https://istudent.kpi.ua/vstup/buklet.html>

