

«...Biotechnology is the science of obtaining required for people materials and products with the use of living organisms and special equipment – the bioengineering...»



**INFORMATION
PACKAGE**

**FACULTY
OF BIOTECHNOLOGY
AND BIOTECHNICS**

Kyiv, 2023

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***** The information provided is current as of the 2023/2024 academic year.**

Please note that minor changes may occur in the list of training specialties and educational programs/specializations for the next academic year.



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1. COMMON DESCRIPTION OF THE FACULTY

The first Ukraine **Faculty of Biotechnology and Biotechnics (FBT)** was founded in January 2001 at the Igor Sikorsky KPI on the base of the Department of Biotechnology of the Faculty of Chemical Technology.



Biotechnology is the science of obtaining required for people materials and products with the use of living organisms and special equipment – bioengineering.

The Faculty provides training of highly qualified professionals for modern sectors of biotechnology: microbial synthesis of biologically active compounds, immune- biotechnology, genetic engineering biotechnology, biotechnology of pharmaceutical drugs, eco biotechnology, bioenergetics, biodegradation of wastes, obtaining a useful substance from the biomass and wastes, bio testing of pollutions, engineering support of biotechnological and pharmaceutical productions, molecular biotechnology and bioinformatics.

Graduates of the Faculty can develop and implement the latest technological processes and design equipment for biotechnological and pharmaceutical productions, monitor and protect the environment from man-made impacts competently and scientifically, and simulate biotechnological processes to determine the optimum conditions of biosynthesis, destruction of wastes, and optimization of damaged ecosystems through the widespread use of the most advanced mathematical methods and computer technology.

2. STRUCTURE

The **Faculty of Biotechnology and Biotechnics** consists of three departments:

- **Department of Industrial Biotechnology and Biopharmacy;**
- **Department of Biotechnics and Engineering;**
- **Department of Bioenergy, Bioinformatics and Environmental Biotechnology,**

and three research laboratories:

- **Laboratory of Physical and Information Technologies in Biology and Medicine;**
- **Laboratory of Magnetic Nanotechnology in Medicine and Biology;**
- **Laboratory of Vacuum Technology in Biology and Medicine.**



3. EDUCATIONAL PROGRAMS

Levels of higher education. Training of students at the **FBT** is carried out at three levels of higher education.

At the first level (Bachelor's course, I–IV academic years), the students acquire fundamental knowledge in chemistry, physics, mathematics, mechanics, computer engineering, 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 and defend a master's theses 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 (Ph.D.).

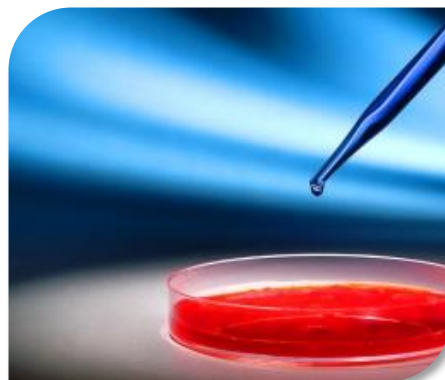
Terms of training: Bachelor – 4 years; Master (education-professional program) – 1.5 years; Master (education-scientific program) – 2 years: Ph.D. – 4 years.

1. Department of Industrial Biotechnology and Biopharmacy provides training under the following Educational Programs:

| Specialty | Educational Program | Levels of higher education | | |
|--|---------------------|----------------------------|-------------------|------------------|
| | | First | Second | Third |
| 091 Biology and Biochemistry | Applied Biology | – | – | Ph.D. <i>ESP</i> |
| 162 Biotechnology and Bioengineering | Biotechnologies | Bachelor <i>EPP</i> | Master <i>EPP</i> | Ph.D. <i>ESP</i> |
| | | | Master <i>ESP</i> | |

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

The department provides scientific and engineering personnel for the biotechnological, biochemical, and chemical industries, food industries, research, and design institutions of the biological and chemical profile, sanitary inspections, firms and institutions that produce food additives and veterinary drugs, control and production laboratories, control and analysis laboratories, certification centers.



Future specialists-biotechnologists are getting three educations: chemical, engineering, and biological. In addition to general scientific and engineering disciplines, students study such disciplines as microbiology and virology, biochemistry, genetics, cell and genetic engineering, immunology, general biotechnology, and fundamentals of pharmaceutical production.

Graduates of the department are working at the leading pharmaceutical and biotech companies of Ukraine, certification laboratories, and biocontrol. They are developing biologically active drugs at the Institute of Microbiology and Virology, Molecular Biology and Genetics, Biochemistry, and others.

2. Department of Biotechnics and Engineering provides training under the following Educational Programs:

| Specialty | Educational Program | Levels of higher education | | |
|--|----------------------------------|----------------------------|-------------------|------------------|
| | | First | Second | Third |
| 133 Industrial Machinery Engineering | Industrial Machinery Engineering | – | – | Ph.D. <i>ESP</i> |
| 162 Biotechnology and Bioengineering | Biotechnologies | Bachelor <i>EPP</i> | Master <i>EPP</i> | Ph.D. <i>ESP</i> |
| | | | Master <i>ESP</i> | |

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

The department trains professionals who are well versed in foreign and domestic equipment of pharmaceutical and microbiological industries, and due to this:

- perform engineering for the implementation of the equipment in domestic plants and factories with subsequent maintenance and service;
- design new equipment for pharmaceutical and microbiological industries for production at domestic machine-building plants.



Graduates of the department are successfully working at the leading enterprises of Kyiv: PJSC "Darnytsia", JSC "Farmak", "Rosynka", PJSC "Biofarma", "Kyiv Winery of Sparkling Wines", PJSC SIC "Borshchahivskyi CPP."



3. Department of Bioenergy, Bioinformatics and Environmental Biotechnology provides training to specialists under the following Educational Programs:

| Specialty | Educational Program | Levels of higher education | | |
|--|---------------------|----------------------------|-------------------|------------------|
| | | First | Second | Third |
| 162 Biotechnology and Bioengineering | Biotechnology | Bachelor <i>EPP</i> | Master <i>EPP</i> | Ph.D. <i>ESP</i> |
| | | | Master <i>ESP</i> | |
| 091 Biology and Biochemistry | Applied Biology | – | – | Ph.D. <i>ESP</i> |

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

Bioinformatics makes it possible to simulate biotechnological processes at the stages of development of industrial technologies and to analyze and predict the properties of new biological structures and molecules.

In addition to the basic disciplines of biological, chemical, and engineering areas students study modern technologies of waste processing of different origins and specially grown biomass into the energy and useful substances that can replace existing synthetic analogs obtained with the use of natural gas and oil.



Students study the new wastewater treatment technology and the design of treatment plants and bioreactors.

At the Department, genetic engineering techniques are used to obtain bacteria, plants, and other organisms with desired properties for use in environmental biotechnology to increase the energy output.

The department has the following research laboratories:

- Laboratory of Physical and Information Technologies in Biology and Medicine;
- Laboratory of Magnetic Nanotechnology in Medicine and Biology;
- Laboratory of Vacuum Technology in Biology and Medicine.

The department is provided with modern equipment such as a probe scanning microscope NanoEducator, centrifuge apparatus, the chamber for horizontal electrophoresis, apparatus for determining the magnetic susceptibility of magnetically sorbents and magnetic pharmaceutical forms, apparatus for producing high-gradient ferromagnetic attachments by electrodeposition in a magnetic field and by magnetically controlled corrosion, photocalorimeters KFK-2, thermostat, pH-meter, sterilizer,



potentiostat, biological microscopes. All above-mentioned equipment is used for carrying out the educational process and in the performance of research works of students and graduate students, as well as for scientific research of the department.

Graduates of the department can work in the biochemical and biotechnological production of pharmaceutical chemicals companies, in the food industry, in the research and design institutions of biological, medical, and chemical areas, diagnostic laboratories, and research centers for the creation of new drugs.

4. TRAINING AND LABORATORY BASE

The academic staff of the faculty actively use modern teaching technology during lectures, practical training, seminars, and laboratory sessions. They apply modern software products, Internet resources, modern means of presentation, and visual support of lectures in the form of films, videos, slides, etc.

5. RESEARCH ACTIVITY

Department of Industrial Biotechnology and Biopharmacy

The main directions of scientific work of the department:

- Biotechnology of microbial synthesis of vitamins.
- Genetic activity of nanocomposites and chemical contamination of agricultural and food products, cosmetics, and household chemicals.
- The use of biotechnology and biotechnology in medicine.
- Biochemistry and biotechnology of higher basidiomycetes.
- Development of technology for probiotic preparations based on lactate bacteria.
- Biotechnology and finished pharma products of bacteriolytic enzymes and antibiotics.
- Development of tools *in-vitro*-diagnostics of infectious diseases and hormonal disorders.
- Biotechnology of fungal carotenoids. Enzyme systems of the genus *Polyporus*.
- Biotechnology of polysaccharides obtained from higher basidiomycetes.

Department of Biotechnics and Engineering

The main directions of scientific work of the department:

- Development of membrane systems for private households;



- The vibration of flat and shell fragments under the influence of kinematic and wave spatial factors;
- Terms of occurrence of the wave coincidence and spatial-frequency resonances;
- Implementation of acoustically transparent structures.
- Remote control of heat transfer process in a bioreactor with an ultrasonic beam;
- Membrane technologies of mixtures treatment;
- Mathematical modeling techniques in biotechnology.

Department of Bioenergy, Bioinformatics and Environmental Biotechnology

The main directions of scientific work of the department:

- Modern technology of biological wastewater treatment;
- Development of microbial fuel cells to produce electricity and hydrogen;
- Biotechnology producing of energy carriers (methane, hydrogen, alcohols, etc.) from the organic wastes of different origins;
- Studies on the impact of physical and chemical factors on the change in microalgae metabolism to produce energy carriers, biologically active substances, and drugs;
- Development of a new magnetic dosage form for targeted drug delivery to the tumor;
- The study of self-organization processes in the system metal-electrolyte in a constant magnetic field;
- Investigation of self-organization processes in the metal-electrolyte system in a constant magnetic field;
- Magnetically controlled biosorption of heavy metal ions by *S.cerevisiae* yeasts in a constant field with the use of the system of ferromagnetic elements;
- Microstructure of metal surfaces by electrodeposition and controlled corrosion in the magnetic field;
- Development of high gradient magnetic matrix and designs of magnetic separators;
- Development of new methods for producing magnetically controlled sorbents, including biosorbents for biomedical purposes.

6. INTERNATIONAL COLLABORATION

The international inter-university cooperation includes joint scientific and educational projects, an organization of short-term exchange programs for students, graduate students, and teachers, and collaborative research.

International interuniversity cooperation includes conducting joint research and educational projects, and organizing short-term exchange and internship programs for students, graduate students, and teachers.



7. CONTACT INFORMATION

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