

"... faculty provides training of specialists for mathematization of science, technology, production, public relations, their formalization, structuring and the most extensive use of mathematical methods for solving of physical, technical, information, and administrative tasks..."



INFORMATION

PACKAGE

**FACULTY  
OF APPLIED MATHEMATICS**

Kyiv, 2016

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\*\*\* 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.



**Foreign Economic Activity Office**

+380 44 236 62 81

[forea@kpi.ua](mailto:forea@kpi.ua)

<http://forea.kpi.ua/>

**Faculty of Applied Mathematics**

+380 44 204 81 15

+380 44 204 91 13

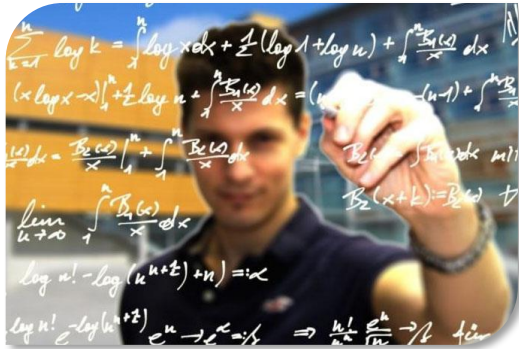
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# 1. COMMON DESCRIPTION AND THE STRUCTURE OF FACULTY

**Faculty of Applied Mathematics (FAM)** provides training of specialists for the



important areas of the modern society life. The mathematization of science, technology, production, public relations is one of the most important fields and involves their formalization, structuring and the most extensive use of mathematical methods for solving of physical, technical, information, administrative and other tasks. Another important aspect of life is the informatization of society with the computer and

software engineering as the basic tools. The latest achievements of fundamental and applied sciences are used in course of training at the Faculty.

**Structure.** The faculty consists of 3 departments.

**1. Department of Applied Mathematics** trains professionals with a degree in "Applied Mathematics" (specialization "Data Science and Mathematical Modeling").

The graduates are skilled specialists in the development of information technology and information systems, mathematical and computer modeling of complex technical systems, processes, and phenomena, the development of mathematical support and software for information processing systems, the development of artificial intelligence, data mining and soft computing.



Students acquire a high-level training that is oriented on the practical use of mathematical methods and modern IT-technologies for a wide range of engineering problems in the field of industrial, economic, environmental, and economic activity.



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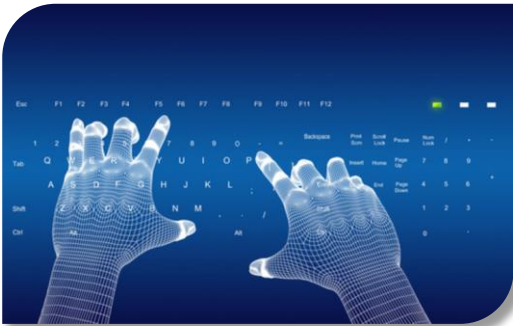
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[fpm@ntu-kpi.kiev.ua](mailto:fpm@ntu-kpi.kiev.ua)  
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**2. Department of System Programming and Special-Purpose Computer Systems** trains experts in "Computer Engineering" (specializations "Computer Systems and Complexes", "System Programming", and "Special-Purpose Computer Systems").



The content of specialists training is the creation of hardware and software for current and future information technologies, development and application of computer systems and networks for general and special purpose, as well as needed system software, special-purpose computer

systems and networks with optimized parameters, embedded computer systems, technical means of information protection in computer systems, local and distributed computer systems, artificial intelligence systems.

**3. Department of Software for Computer Systems** prepares experts in "Software Engineering" (specialization "Software for Computer and Information Retrieval Systems").

Students are trained to develop the software for computer systems and networks, operating systems, technical and corporate systems, decision support systems, automated control systems, intelligent and expert systems, business software, web-portals, multimedia software, database and knowledgebase, software diagnostics and certification systems, software for information protection in computer systems and networks.



**E-learning Centre** is a part of the department. The purpose of its activities is an organization of distance learning by means of modern information technology with the use of educational materials provided by the Polish-Japanese Institute of Information Technology; video conferencing, holding of seminars, workshops, and courses on specific subjects of training in information technology (within the implementation of the project). The informational and methodological basis of the Center consists of 47 distance learning courses.



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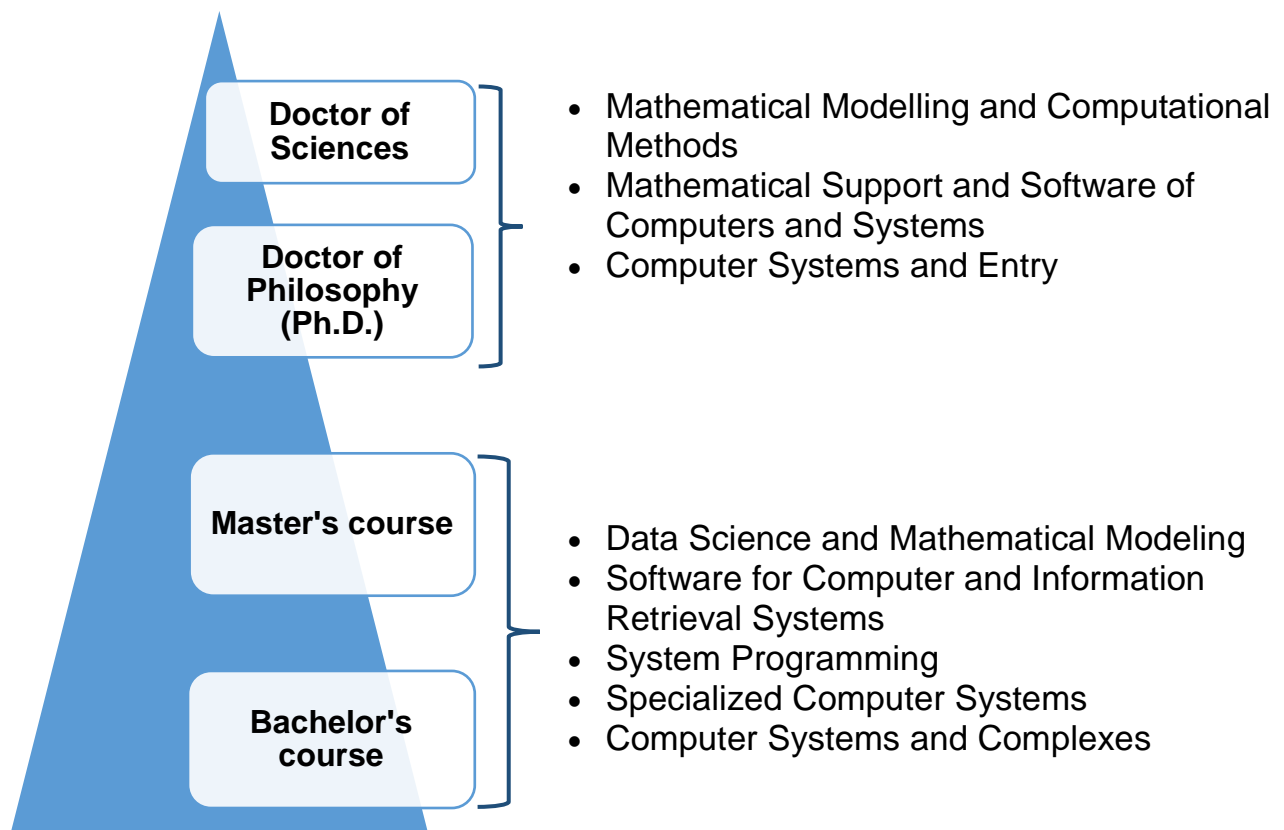
## 2. EDUCATIONAL PROGRAMS

**Levels of higher education.** Training of students at the FAM is carried out at several levels of higher education. The first (Bachelor's, I-IV academic years) – the students acquire knowledge in physics, mathematics, mechanics, computing, informatics, and special disciplines. During the IV year, they defend bachelor course work and receive qualification degree Bachelor. At the second level (Magistracy, V - VI academic years) training is carried out according to the Master's 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 in Bachelor's course and Magistracy), Graduate course / Doctoral candidacy lasts 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 FAM:



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## Faculty trains specialists in the area of:

- information technologies;
- the design of operating systems;
- development of the system and applied software;
- the design of automation systems;
- scientific research;
- expert systems;
- development and use of computer systems and general purpose networks;
- specialized computer systems and networks with optimized parameters;
- protection of information in computer systems, local and distributed computing systems.

**Graduates of the faculty work** in institutes of the National Academy of Sciences of Ukraine, sectoral research institutes, organizations and enterprises that are engaged in the development and implementation of mathematical methods, computer and software systems, and other software and hardware automation of information, production, design and research processes, providing information technologies, protection of information, etc.

### 3. TRAINING AND LABORATORY BASE

Faculty computers are connected to a local network that is the part of the telecommunication network of Igor Sikorsky KPI and solves the following main tasks: efficient user access to the centralized internal university resources; effective high-speed user access to information resources of global networks through the central University Internet center; effective access of external users to the centralized information resources of the University; system of distance learning and others. All the faculty's departments have assigned training laboratories and classrooms with the necessary number of workplaces.

Training laboratory of embedded computer systems was formed to provide the educational process at the **Computer Systems Software Department** with the support of the company Motorola, which presented more than 20 presetting boards with processors of ColdFire family and DSP-processors for digital signal processing. Since 2007, a new Laboratory of Embedded Computer Systems (LECS) operates with the support of the company Freescale. Laboratory is equipped with the latest computer and office technics.



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## 4. RESEARCH ACTIVITY

The main directions of scientific research of the *Department of Applied Mathematics*:

### 1. Data Science:

- data mining;
- privacy-preserving data publishing;
- soft computing (non-rigid calculation = fuzzy logic, neural networks, evolutionary computation);
- recommender systems;
- nondyad wavelet decompositions;
- methods of detecting of fraudulent practice in contextual advertising systems.

### 2. Mathematical and Computer Modelling:

- computational methods for solving partial differential equations;
- computational fluid dynamics;
- finite element methods;
- regression models and the theory of identification.

### 3. System Engineering:

- development of information theory of corporate structures as a system of scientific, technological and economic processes and models;
- development of the theoretical fundamentals for the creation of complex geographically distributed multi-level information systems.

**Special-purpose Computer Systems Department** solves the following scientific problems:

- nontraditional forms of digital information representation and its processing capabilities;
- methods and technics for optimizing of structures and algorithms of functionally oriented computing facilities;
- real-time hardware and software algorithmic computational tools;
- computer-based tools and information protection algorithms;
- specialized expert systems, means of their support;
- information management in computer systems and networks;
- embedded hardware and software computing resources;



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- table, table-algorithmic and table-recursive computational tools;
- structures and algorithms of specialized processors;
- dispatch of information flows in distance learning;
- control of digital equipment for the optimal use of instrumental and temporal redundancy;
- pseudo-random testing of digital devices, methods, and tools;
- test feasible design of digital circuits and systems;
- the controlled generator of pseudo-random number sequences for various applications.
- fault-tolerant multiprocessor systems, modeling of their behavior in a stream of refusals.

**Computer Systems Software Department** investigates the following issues:

- methods and technics of software engineering;
- development of software technologies;
- software certification;
- software reliability estimation;
- software for computer systems and networks;
- software data protection;
- methods and algorithms of graphical information compression.



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## 5. INTERNATIONAL PROJECTS AND COLLABORATION

**Department of Applied Mathematics** maintains close scientific and educational ties with universities, educational and scientific institutions: Carinthia University of Applied Sciences (Austria), Polish-Japanese Institute of Information Technology (Poland), École Polytechnique Paris (France), Université du Maine (Le Mans, France), ParisTech – Institut des Sciences et Technologies de Paris (France), Russian Association of Artificial Intelligence (Russia), Technical University of Munich (Germany), technical University of Udine (Italy), «Angel Kanchev» University of Ruse (Bulgaria), Yerevan State University (Armenia), St. Petersburg Polytechnic University (Russia), St. Pölten University of Applied Sciences (Austria), Xi'an Research Institute of Navigation Technology (China), University of Tallinn (Estonia), Microsoft Development Center, Copenhagen (Denmark), the Company «Freescale» (USA).

The faculty has an E-learning Center Igor Sikorsky KPI, which was established in 2005 within the framework of the UN Development Program in Ukraine in cooperation with the Polish-Japanese Institute of Information Technology.

Also, work is continuing on a student business incubator, which is based on the FAM in the framework of the international project «Supporting economic transformation of Ukraine by the establishment of business incubators at technical universities».

Department of Applied Mathematics has joint projects not only with educational institutions but also supports scientific and industrial cooperation with many famous companies. For example, the Department collaborate with company «Freescale» (USA), as well as with the Ukrainian company «Information Software Systems» through the development of scientific and methodological support of special-purpose processors designing.



Foreign students and postgraduates from Moldova, Turkmenistan, Russia, Turkey, Afghanistan, Vietnam, China, Lithuania, Libya, Yemen, Israel (Palestinian Authority), Iran, Mexico, Syria, Jordan, Dominican Republic, Morocco and Peru also enrolled in the faculty together with Ukrainians.



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<http://fpm.kpi.ua>



## 6. CONTACT INFORMATION

### 1. Faculty Dean: Prof. Dr. of Technics Dychka I.A.

*Address:* 14-a, Polytechnichna Street, Ed. Building 14, Kyiv, Ukraine, 03056

*Phones:* +380 44 204 81 15, +380 44 204 91 13

*e-mail:* [fpm@ntu-kpi.kiev.ua](mailto:fpm@ntu-kpi.kiev.ua)

*Official website:* <http://fpm.kpi.ua>

### 2. Department of Applied Mathematics

*Head of Department:* Associate Prof. Dr. of Technics Chertov O.V.

*Phone:* +380 44 236 95 05

*Official website:* <http://pma.fpm.kpi.ua/uk>

### 3. Special-purpose Computer Systems Department

*Head of Department:* Prof. Dr. of Technics Tarasenko V.P.

*Phone:* +380 44 236 32 02

*Official website:* <http://www.scs.kpi.ua>

### 4. Computer Systems Software Department

*Acting Head of Department:* Assoc. Prof. Ph.D. in Tech. Sci. Zabolotnaya T.N.

*Phone:* +380 44 204 91 13

*Official website:* <http://pzks.fpm.kpi.ua>



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