Approved by the decision
of the MIPT Academic Council
dated May 30, 2024
(protocol No. 01/05/2024)

Federal State Autonomous Educational Institution of Higher Education "Moscow Institute of Physics and Technology (National Research University)"

THE MAIN EDUCATIONAL PROGRAM OF HIGHER EDUCATION

Level of higher education
BACHELOR

Domain of study
09.03.01 INFORMATION SCIENCE AND COMPUTER ENGINEERING

Orientation (specialty)
COMPUTER SCIENCE/ИНФОРМАТИКА

Starting year of the educational program
2024 y.

Update of the educational program:
decision of MIPT Academic Council dated April 24, 2025 (protocol No. 01/04/2025)

The main educational program of higher education in the field domain of study 09.03.01 Information Science and Computer Engineering, orientation (specialty) Computer Science/Информатика, implemented at MIPT, is a set of basic characteristics of education (volume, content, planned results), organizational and pedagogical conditions, forms of certification, which is presented as a general characteristic of the educational program, curriculum, academic calendar schedule, work programs of disciplines (modules), training programs, evaluation and methodological materials. The main educational program of higher education has been created on the basis of the educational standard domain of study 09.03.01 Information Science and Computer Engineering, independently developed and approved by MIPT.

1. General characteristics of the educational program

Qualifications awarded to graduate: bachelor.

Form of education: full-time

Education period: 4 years.

The educational program consists of: 240 credits and includes all types of student's classroom and independent work, training, time, allotted for quality control of the mastering of the educational program by the student.

The contact work of students with teachers consists of, at least, 4 165 hours.

Program implementation language: english.

Using a network form of educational program implementation: no.

Program goal:

Training of highly qualified personnel who have deep knowledge not only in the field of modern computer technology, fundamental and applied mathematics, but are also able to conduct scientific research based on the latest advances in mathematics and information technology.

Students on this program receive training in the field of fundamental and applied mathematics, mastering the apparatus of probability theory and mathematical statistics, discrete mathematics, differential geometry and topology, group theory and computational complexity, optimization methods, as well as in the field of information science and programming, gaining advanced skills in such areas as algorithms and programming languages, system programming and distributed systems, machine learning, data storage and analysis.

Graduates of this program can participate in all stages of creating high-tech software products, from a science-intensive idea to putting an idea on the market with the help of a start-up company, both as a developer, and as a manager or analyst.

2. Characteristics of the professional activity of graduates:

Fields of professional activity and areas of professional activity,

in which graduates, who have mastered the bachelor's program, can carry out professional activities:

06 Communications, information and communication technologies (in the field of software design, development and testing; in the field of design, creation and support of information and communication systems and databases; in the field of creation of information resources in the information and telecommunications network "Internet" (hereinafter referred to as the "Internet" network); in the field of design, development, implementation and operation of computer equipment and information systems, management of their life cycle)..

Graduates can carry out professional activities in other fields of professional activity and (or) areas of professional activity, provided that their level of education and acquired competencies meet the requirements of the employee's qualification.

Types of tasks of professional activity of graduates:

research.

Tasks of professional activity of graduates:

collection and processing of scientific and analytical information using modern programs, tools and methods of computational mathematics, computer and information technologies;

исследование и разработка математических моделей, алгоритмов, методов, программного обеспечения, инструментальных средств по тематике выполняемых научно-исследовательских проектов.

Objects of professional activity of graduates, mastered the program Bachelor's:

automated information processing and control systems;

software for computer hardware and automated systems (programs, software packages and systems).

3. List of professional standard, corresponding to the professional activities of graduates:

06.001 Programmer.

Code and name of the professional standard	Generalized labor functions			Labor functions		
	code	name	level of qualification	name	code	level of qualification
06.001 Professional standard "Programmer"	C	Integration of software modules and components and testing the functionality of software product releases	5	Development of procedures for software modules integration	C/01.5	5
	D	Requirements development and software design	6	Analysis of the possibilities of implementing computer software requirements	D/01.6	6
				Computer software design	D/03.6	6

4. Requirements for the results of mastering the educational program

As a result of mastering the main educational program, the graduate should form universal, general professional and professional competencies.

Universal competencies of graduates and indicators of their achievement:

Code and name of competence	Code and name of the indicator of competence achievement
UC-1 Search and identify, critically assess and synthesize information, apply a systematic approach to problem-solving	UC-1.1 Analyze problems, highlight the stages of their solution, plan actions required to solve them UC-1.2 Find, critically assess, and select information required for the task in hand UC-1.3 Consider various options for solving a problem, assess the advantages and disadvantages of each option UC-1.4 Make competent judgments and estimates supported by logic and reasoning UC-1.5 Identify and evaluate practical consequences of possible solutions to a problem
UC-2 Determine the range of tasks for the set goal and select the best way(s) to solve them, based on current legal regulations, available resources, and constraints	UC-2.1 Determine a set of interrelated tasks required to achieve the current objective, define the expected results of these tasks UC-2.2 Work out a solution to a specific task within a project, selecting the best way(s) to solve it, based on current legal regulations, available resources, and constraints
UC-3 Interact effectively with project team members and fulfill one's role properly	UC-3.1 Establish different types of communication (educational, scientific, business, informal, etc.) UC-3.2 Interact with other team members to fulfill the project objectives
UC-4 Conduct business communication in oral and written form in Russian and a foreign language	UC-4.1 Demonstrate the ability to exchange business information in oral and written form in Russian and at least one foreign language UC-4.2 Use modern information and communication tools to communicate
UC-5 Reflect on the cultural diversity of society from social-historical, ethical, and philosophical perspectives	UC-5.1 Demonstrate the knowledge of the basics of philosophy, history, the foundations of intercultural communication UC-5.2 Understand ethical and intellectual norms and values, their role in the history of society

UC-6 Use time-management skills, apply principles of self-development and lifelong learning	UC-6.1 Determine professional priorities and ways to improve professional performance through self-assessment UC-6.2 Plan independent activities in professional problem-solving; critically analyze the work performed; find creative ways to use relevant experience for self-development
UC-7 Maintain an adequate level of physical fitness to undertake social and professional activities	UC-7.1 Learn the basics of healthy living, health saving technologies, physical education UC-7.2 Understand the impact of physical education on health promotion and prevention of occupational diseases UC-7.3 Maintain one's physical fitness level; demonstrate general and professionally oriented physical agility; make various individual fitness plans
UC-8 Establish and maintain a safe living environment, including in the event of emergencies	UC-8.1 Learn the classification and causes of natural and human-made disasters; causes, signs, and consequences of hazards, safety procedures in case of emergency UC-8.2 Maintain a safe living environment; identify the signs, causes, and conditions of emergencies; assess the likelihood of potential hazards and take measures to prevent them UC-8.3 Forecast the occurrence of dangerous or emergency situations and necessary safety measures in case of emergency
УК-9 Способен принимать обоснованные экономические решения в различных областях жизнедеятельности	УК-9.1 Понимает базовые принципы функционирования экономики и экономического развития. УК-9.2 Знает основные виды и источники возникновения экономических и финансовых рисков и подходы к их снижению. УК-9.3 Владеет основами экономического анализа для принятия обоснованных экономических решений.
UC-10 Able to form an intolerant attitude towards manifestations of extremism, terrorism, corrupt behavior and counteract them in professional activity	UC-10.1 Understands the nature of the occurrence and danger of extremism, terrorism, corruption, the need to actively counter extremism, terrorism and corruption and the importance of forming a personal position in relation to extremism, terrorism and corrupt behavior UC-10.2 Knows the causes that generate extremism, terrorism and corruption, the possible forms of their manifestation, the principles (legal, administrative, organizational, etc.) of countering extremism, terrorism and corruption, the formation and implementation of policies to counter extremism, terrorism and corruption, as well as the basics of anti-corruption actions in various areas of life UC-10.3 Knows how to analyze the causes and prerequisites for the occurrence, the nature of manifestation and consequences of corrupt actions and is able to contribute to the implementation of the policy of countering extremism, terrorism, corruption and form a personal position on the main issues of a civil and ethical nature, demonstrating an intolerant attitude towards extremism, terrorism and corrupt behavior

General professional competencies of graduates and indicators of their achievement:

Code and name of competence	Code and name of the indicator of competence achievement
Gen.Pro.C-1 Apply fundamental knowledge acquired in the physical and mathematical fields and/or natural sciences and use it in professional settings	Gen.Pro.C-1.1 Analyze the task in hand, outline the ways to complete it Gen.Pro.C-1.2 Build mathematical models, make quantitative measurements and estimates Gen.Pro.C-1.3 Determine the applicability limits of the obtained results
Gen.Pro.C-2 Use modern IT and software tools to perform professional tasks in compliance with information security requirements	Gen.Pro.C-2.1 Apply modern computing tools and Internet services in professional settings Gen.Pro.C-2.2 Apply numerical mathematical methods and use software applications for scientific problem-solving in professional settings Gen.Pro.C-2.3 Fulfill basic information security requirements

Gen.Pro.C-3 Write scientific and/or technical (technological, innovative) reports (publications, projects)	Gen.Pro.C-3.1 Meet the general criteria for submission of manuscripts, scientific and technical documentation and use relevant software applications Gen.Pro.C-3.2 Employ practical methodologies for preparing scientific and technical reports (projects) Gen.Pro.C-3.3 Visually and graphically present scientific (scientific and technical, innovative technological) outcomes in the form of reports, scientific publications
Gen.Pro.C-4 Collect and process scientific and technical and/or technological data for fundamental and applied problem-solving	Gen.Pro.C-4.1 Apply scientific research and intellectual analysis methods for professional problem-solving Gen.Pro.C-4.2 Search for primary sources of scientific and technical and/or technological information in professional settings Gen.Pro.C-4.3 Prepare abstracts, reports, bibliographies, and reviews of information in professional settings Gen.Pro.C-4.4 Use computer and network skills to obtain, store, and process scientific (technical, technological) information
Gen.Pro.C-5 Participate in fundamental and applied research and development activities; independently develop new theoretical research methods (including mathematical research methods) and work with modern experimental scientific research, measuring and analytical, and technological equipment	Gen.Pro.C-5.1 Perform tasks in the field of theoretical and experimental research and development activities Gen.Pro.C-5.2 Apply new knowledge through the study of literature, scientific articles, and other sources Gen.Pro.C-5.3 Professionally use modern experimental scientific research (measuring and analytical, technological) equipment

Professional competencies of graduates and indicators of their achievement:

Code and name of competence	Code and name of the indicator of competence achievement	Basis (professional standarts, analysis of other requirements for graduates)
type of professional activity tasks: research		
Pro.C-1 Assign, formalize, and solve tasks, develop and research mathematical models of the studied phenomena and processes, systematically analyze scientific problems, obtain new scientific outcomes	Pro.C-1.1 Locate, analyze, and summarize information on current research findings within the subject area Pro.C-1.2 Make hypotheses, build mathematical models of the studied phenomena and processes, evaluate the quality of the developed model Pro.C-1.3 Apply theoretical and/or experimental research methods to a specific scientific task and interpret the obtained results	Programmer
Pro.C-2 Conduct scientific research and testing independently or as a member (leader) of a small research team	Pro.C-2.1 Apply the principles of scientific work, methods of collecting and analyzing the obtained data and ways of argumentation Pro.C-2.2 Conduct scientific research independently or as a member (leader) of a small research team Pro.C-2.3 Present research results through scientific publications and participation in conferences	Programmer

5. Curriculum

The curriculum (Appendix 1) determines the list, labor input, sequence and distribution by periods of study of academic disciplines (modules), trainings, other types of educational activities, forms of intermediate and final certification of students. The labor input of the educational program is set in credit units.

The volume of compulsory part, excluding the volume of the state final attestation, is 60,83 persents percent of the total volume of the program.

The matrix of compliance of competencies with the disciplines of the curriculum is given in Appendix 2.

6. Academic calendar schedule

Academic calendar schedule (Appendix 3) shows the distribution of types of educational activities, periods of attestation of students and vacations by year of study (courses) and within each academic year. The academic calendar schedule of the educational program of higher education includes 196 3/6 weeks, of which there are 117 4/6 weeks of theoretical and practical training, 41 1/6 weeks of the credit-examination period, 1 4/6weeks of the state final certification and 36 weeks of holidays.

7. Work programs of disciplines (modules)

Work programs of disciplines (modules), including evaluation materials for ongoing monitoring of progress and intermediate certification, are presented in Appendix 4.

8. Practice programs

The educational program provides for the following trainings:

Research Practice/Научно-исследовательская практика (Учебная): academic practice;

Personal Research Project/Научно-исследовательская работа: practical training.

Work programs of trainings, including assessment materials for ongoing monitoring of progress and intermediate certification are presented in Appendix 5.

9. Program of the state final certification

As part of the state final certification, the following are provided:

Preparation for and Taking State Examination in Mathematics/Подготовка к сдаче и сдача государственного экзамена по математике;

Preparation for and Taking State Examination in Informatics and Computer Engineering/Подготовка к сдаче и сдача государственного экзамена по информатике и вычислительной технике;

Performance of and Defence of Graduation Thesis/Выполнение и защита выпускной квалификационной работы.

The program of the state final certification (Appendix 6) includes program of state examination and requirements for final qualifying works (volume, structure, design, presentation), the procedure for their implementation, the procedure for defending the final qualifying work, criteria for evaluating the results.

10. Material and technical, educational and methodological support of the educational program

The work programs of disciplines (modules), practices determine the material and technical and educational and methodological support of the educational program, including a list of licensed and freely distributed software, a list of electronic educational publications and (or) printed publications, electronic educational resources, a list and composition of modern professional databases and information reference systems.

Classrooms for conducting training sessions provided for by the educational program are equipped with equipment and technical means of training, the composition of which is determined in the work programs of disciplines (modules) and practices.

The premises for independent work of students are equipped with computer equipment with the ability to connect to the Internet and are provided with access to the electronic information and educational environment of MIPT.

MIPT's electronic information and educational environment provides access to:
– to EBS:
EBS "University Library online";

"Book on Lime" by the publishing house "University Book House";
EBS of "Lan" publishing house;
EBS of "Yurait" publishing house;
EBS of "IBooks.ru" publishing house;
EBS Books.mipt.ru;
EBS ZNANIUM.COM.

access to the collections of the National Electronic Library.

- scientific foreign and Russian journals and electronic databases:
database “Uspekhi Fizicheskikh Nauk” Autonomous non-profit organization Editorial Office of the journal “Uspekhi Fizicheskikh Nauk”;
journals of the Russian Academy of Sciences;
journals of the Steklov Mathematical Institute of the Russian Academy of Sciences: Mathematical journals (mathnet.ru): Izvestia of the Russian Academy of Sciences. Series mathematical, Mathematical Collection, Uspekhi matematicheskikh nauk;
electronic version of the journal "Quantum Electronics" Lebedev Physical Institute of the Russian Academy of Science;
Russian journals on the East View platform of IVIS;
Full-text journal Science Online (American Association for the Advancement of Science);
Journals database (Bentham Science Publishers);
EBSCO eBooks database (EBSCO Information Services GmbH);
Wiley Journal Database;
archival journal collection Wiley Journal Backfiles (2005-2013);
archival collection of journals Wiley Journal Backfiles (2014 -2022);
journals of the Russian Academy of Sciences;
World Scientific Complete eJournal Collection database (World Scientific Publishing Co Pte Ltd.;
Academic Reference Database (China Academic Journals (CD Edition) Electronic Publishing House Co., Ltd);
The Cochrane Library database (John Wiley & Sons, Inc.);
CSD-Enterprise database (The Cambridge Crystallographic Data Centre).

Material, technical and methodological support of the educational program is carried out on the material and technical base of MIPT.

11.Features of the educational program implementation for the disabled and persons with special needs

If there are persons with disabilities or persons with special needs among students, the educational program is adapted taking into account the special educational needs of such students.
When teaching according to an individual curriculum for people with disabilities, the period for mastering the educational program can be extended at their request by no more than one year compared to the period for obtaining education for the corresponding form of education.

12. Staff conditions for the implementation of the educational program

The implementation of the main educational program is provided by executives and scientific and pedagogical workers who have a basic education corresponding to the profile of the discipline taught, and an academic degree or experience in the relevant professional field and systematically engaged in scientific and (or) scientific and methodological activities.

The share of scientific and pedagogical staff (in teaching loads reduced to integer values) with an education corresponding to the profile of the discipline (module) being taught, in the total number of scientific and pedagogical staff implementing the Bachelor's program is more than 70 persents.

The share of scientific and pedagogical staff (in teaching loads reduced to integer values) who have an academic degree (including an academic degree awarded abroad and recognized in the Russian Federation) and (or) an academic title (including an academic title obtained abroad and recognized in the Russian Federation), in the total number of scientific and pedagogical staff implementing the Bachelor's program, is more than 60 persents.

The share of scientific and pedagogical staff (in teaching loads reduced to integer values) from the number of managers and employees whose activities are related to the orientation (specialty) of the ongoing Bachelor's program (having work experience in this professional field for more than 3 years) in the total number of employees implementing the master's program is more than 5 persents.

13. Information about the departments involved in the implementation of the educational program

Chair of Discrete Mathematics: head of Chair - Doctor of Physics and Mathematical Sciences, Full Professor Raygorodskiy Andrey Mikhaylovich, chief Researcher - Head of the Laboratory. In the modern world, the role of mathematics and information technology continues to grow, and IT specialists are in high demand in the labor market. Discrete mathematics is the basis of so many modern applications. Students studying at the Department of Discrete Mathematics receive fundamental training in mathematical sciences, such as: the theory of algorithms and computational complexity, mathematical logic, probability theory and mathematical statistics, combinatorial (algebraic) topology, combinatorial algebra and combinatorial geometry and actively apply it in practice . Many of us continue to teach at the bachelor's degree in the Yandex Basic Department of Data Analysis, as we find new ideas and approaches in web technologies, in the analysis of the data structure. Part of our team is employed by Yandex, they work in the Department of Theoretical and Applied Research.