

Mathematical modeling in condensed matter physics

National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)

Degree or qualification is awarded: **Master degree**

Language of study: **Russian**

Mode of study: **full-time**

Duration: **2 years**

Availability of free education: **yes**

Price: **145 470 rubles per semester**

Programme curator: **Prof. Nikolai N. Kargin**

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Goals of the Program

The purpose of the program is the training of skilled, allowing to work successfully in the sphere of activities related to mathematical modeling and theoretical research in the field of condensed matter physics. The program also provides common cultural and professional competences, contributing to social mobility and sustainability in the labour market.

Characteristics of the scope and objects of professional activity of future graduates: academic, research and departmental organization related to solving scientific and technical problems; research and computing centers; research and production associations; educational organizations of secondary professional and higher education; state government; organization of Ministries of the Russian Federation; organization of various forms of ownership, industry and business engaged in the development and use of information systems, scientific achievements, products and services in the field of applied mathematics and Informatics.

Objects of the professional activity: mathematical modeling, mathematical physics, inverse and ill-posed problems; numerical methods; probability theory and mathematical statistics; operations research and system analysis; optimization and optimal control; discrete mathematics; nonlinear dynamics, computer science and management; mathematical models of complex systems: theory, algorithms, applications; mathematical and computer methods of image processing; mathematical and informational support of economic activity; mathematical methods and software for information protection; mathematical and software of computer networks; information systems and their study by methods of mathematical forecasting and system analysis; high performance computing and parallel programming technologies; computational nanotechnology; intelligent systems; software engineering; system programming; tools, technologies, resources and services of e-learning and mobile learning; applied Internet technology; automation of scientific research; programming languages, algorithms, libraries and software packages, products, system and application software; system and application software; database; enterprise management systems; networking technology.

Brief description of the curriculum

The curriculum is based on the bachelor program "Applied mathematics and Informatics". Crucial courses: "Research masters work", "Continuous mathematical models", "Discrete mathematical models", "Quantum computer science", "Numerical Monte Carlo methods", "Mathematical theory of the catastrophes", "Nanophysics and nanotechnology (special seminars)", "Molecular dynamics in multiscaled modeling", "Quantum mechanics in modeling of molecular and extended systems", "Methods of description of processes in ensembles of nanoparticles"

Part of the curriculum is also implemented in English.

The base of industrial and/or scientific practice and employment

National Research Centre "Kurchatov Institute", Russian Federal Nuclear Center – All-Russia Research Institute of Experimental Physics (Sarov), Dukhov All-Russia Research Institute of Automatics, Center for Photochemical Sciences of the Russian Academy of Sciences, etc.

Graduates are currently required in a variety of businesses and research organizations of the Rosatom State

Corporation, federal nuclear centers, the Russian Academy of Sciences, etc., including Ioffe Physical and Technical Institute of the Russian Academy of Sciences and Scientific and Engineering Centre for Nuclear and Radiation Safety.

Specializations within this programme

Applied Mathematics and Informatics

Objects of the professional activity

- Mathematical modeling, mathematical physics, inverse and ill-posed problems;
- numerical methods;
- probability theory and mathematical statistics;
- operations research and system analysis;
- optimization and optimal control;
- discrete mathematics;
- nonlinear dynamics, computer science and management;
- mathematical models of complex systems: theory, algorithms, applications;
- mathematical and computer methods of image processing;
- mathematical and informational support of economic activity;
- mathematical methods and software for information protection;
- mathematical and software of computer networks;
- information systems and their study by methods of mathematical forecasting and system analysis;
- high performance computing and parallel programming technologies;
- computational nanotechnology;
- intelligent systems;
- software engineering;
- system programming;
- tools, technologies, resources and services of e-learning and mobile learning;
- applied Internet technology;
- automation of scientific research;
- programming languages, algorithms, libraries and software packages, products, system and application software;
- system and application software;
- database;
- enterprise management systems;
- networking technology.