

# Electronics and Automation of Physical Installations

National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)

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

Language of study: **Russian**

Mode of study: **full-time**

Duration: **5 years**

Availability of free education: **yes**

Price: **242 320 rubles per semester**

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## Brief description of the program

**Objective:** Training of highly qualified specialists in the following areas: research and development of new principles of operation of micro- and nanoelectronic devices, development of methods and means of design and manufacturing; study of the properties of optoelectronic devices, micro- and nanoelectronic sensors and actuators; investigation of their functioning in the instrumentation and control systems; and development of theoretical models to account for the effects of ionizing, laser, and electromagnetic radiations on electronic devices; development of systems of control and data acquisition and processing on the basis of modern microprocessors, programmable logic circuits, analog devices, optoelectronic and nanoelectronic devices; designing of new types of integrated circuits, systems-on-chip, sensors and transducers, optoelectronic and nanoelectronic devices and systems; development of the technology for manufacturing modern micro- and nanoelectronic devices and systems, including creation of radiation-resistant products.

**Programs planned for training:** "Training for science centers," "A new generations of nuclear energy technology for the period of 2010–2020", "Program of Innovative Development of Rosatom", and "National Technological Base".

## Basic department

Micro- and Nanoelectronics (# 27)

## Characteristics of the scope and objects of professional activity of future graduates

Research and development of new principles of operation of micro- and nanoelectronic devices, the creation of methods and means of designing and manufacturing; study of the properties of optoelectronic devices, micro- and nanoelectronic sensors and actuators, the organization of their operation in the control, measuring and control systems; development of theoretical models for the effects of ionizing, laser and electromagnetic radiation on electronic equipment; development of control systems, data acquisition and processing based on modern microprocessors, programmable logic chips, analog devices, optoelectronic and nanoelectronic devices; the design of new types of integrated circuits, systems on a chip, sensors and transducers, optoelectronic and nanoelectronic devices and equipment; the development of manufacturing technology of modern micro- and nanoelectronic devices and systems, including the creation of radiation-resistant products and products.

## Brief description of the curriculum

The curriculum provides theoretical training during the 9 semesters, training and defense of the graduation project at the 10th semester. The educational process is combined with an active research work, which is performed under the guidance of experienced professionals in the research laboratories of the department and key enterprises.

The main basic and special courses: "Fundamentals of Microelectronics," "Integrated Circuits Design," "Microprocessor-Based Systems," "Physics of Micro- and Nanostructures," "Physical Facilities," "Physical Basis of Nanoelectronics," "Optoelectronic Devices and Systems," "Micro- and Nanoelectronic Sensors and Transducers," "Modern Micro- and Nanoelectronic Technologies," "Reliability and Radiation Resistance of Microelectronic Devices and Systems", "Design of Integrated Circuits and Systems-on-Chip," and "Telecommunication Systems and Networks."

The combination of profound theoretical knowledge and practical skills in research and design of micro- and nanoelectronic devices and systems provide the high demand in the labor market and create conditions for rapid professional growth.

## **Practices**

1. Practical training on computers (distributed educational practice is carried out in the weeks of the theoretical training in accordance with the curriculum)
2. Pre-diploma practice is carried out by the 10th semester

## **Modules**

- Humanities disciplines module
- Natural sciences module
- General professional module
- Professional module with the disciplines of specialization

## **The base of industrial and/or scientific practice and employment**

Dukhov All-Russia Research Institute of Automatics, Research Institute of Instruments, Eleron Special Research and Production Association, Institute for System Studies of the Russian Academy of Sciences, Institute of Space Instrument Engineering, Module Research Center, Research Center of Computer Technology, and MCST.

**The program of continuous training:** Specialist's Degree - Post Graduate

## **Specializations within this programme**

### **Objects of professional activity**

Work in the research and design organizations and enterprises of nuclear, aerospace, electronic and allied industries as professionals - research and development of new types of micro- and nanoelectronic devices and electronic systems for various applications, including systems implemented on the chip.