

## POST - GRADUATE PROGRAM

"Computing Systems and Their Elements"

Scientific qualification 2.3.2 "Computing Systems and Their Elements"  
(engineering sciences)

**Graduating department:** Department of Electronics (No. 3)

**Form of study:** full-time

**Duration of study:** 3 years

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**The objective of the program:** This graduate program is aimed on preparing a dissertation for the degree of Candidate of Technical Sciences in the field of computing systems and their elements. Graduate students are offered an opportunity to participate in experiments on a modern unique laboratory base and computing complexes using licensed university editions of CAD, such as the Engineering Center, a small accelerator laboratory and the Center for Extreme Applied Electronics. Students will be given an opportunity to participate in various R&D in the priority areas, for example, the State Program of the Russian Federation "Development of electronic and radio-electronic industry for 2013-2025", grants for the development of integrated circuits for Russian and international scientific projects, etc.

### **Area of scientific research:**

- The development of scientific creation frameworks and the study of general properties and principles of computing systems and their elements' operation.
- The elaboration on the fundamentally new methods for the analysis and synthesis of computing systems and their elements, with the aim of improving technical characteristics, including new processor elements, complex functional blocks, systems and networks on a chip or in a case, quantum computers, industrial internet of things and artificial intelligence.
- Development of scientific approaches, methods, algorithms and programs that ensure reliability, fault and failure resistance, control and diagnostics of the functioning of computing systems and their elements.
- Theoretical analysis and experimental study of the computing systems and their elements' functioning under normal and extreme conditions in order to improve their technical-economic and operational characteristics.
- Development of scientific methods and algorithms for organizing arithmetic, logical, symbolic special data processing, storage and input-output of information.
- Development of scientific approaches and methods, architectural and structural solutions that ensure effective technical implementation of hardware-software

systems and complexes through optimization of applied electronic component base, elements of computing systems and embedded software.

- Development of scientific methods and algorithms for organizing parallel and distributed information processing, multiprocessor, multicore, multimachine and special computing systems.
- Development of scientific methods and algorithms for creating architectures and structures of computing systems, network protocols and data transmission services in computing systems, interaction between computing systems built using various telecommunications, mobile and special technologies."

Partner organizations, that took part in conducting joint scientific research:

- State Corporation "Rosatom"
- FSUE "RFNC-VNIIEF"
- Rostech
- JSC "ENPO SPELS"
- JSC "FTCNIWT" SNPO "Eleron"
- SRAI
- FRC "Kurchatov Institute"
- FSUE "Comet"
- CJSC NTC "Module"
- JSC "Angstrom"
- JSC "NIIME and Micron Plant"
- FSUE FNC NIISI RAS
- NGO "Integral"
- SRIET (Scientific – Research Institute of electronic technology)
- CJSC "Milandr"
- FSUE "SRIMS"
- FSUE "SRIIM"

**Scientific groups, scientific laboratories, centers of MEPhI (if available):**

- Laboratory "Design of specialized integrated circuits"
- Laboratory "Educational and scientific laboratory "Nano-VLSI SNK"
- Engineering Center
- Department of Strategic Development of the Engineering Center
- Department of Production and Prototyping of the Engineering Center
- Department of Development of the Engineering Center
- Small Accelerator Laboratory of the Institute of Nanotechnology in Electronics, Spintronics and Photonics

- Center for Extreme Applied Electronics of the Institute of Nanotechnology in Electronics, Spintronics and Photonics
- Radioisotope Laboratory of the Center for Extreme Applied Electronics of the Institute of Nanotechnology in Electronics, Spintronics and Photonics
- Center for Radiophotonics and Microwave Technologies of the Institute of Nanotechnology in Electronics, Spintronics and Photonics.

**Defense in the Dissertation Council of MEPhI.**