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| **MINISTRY OF SCIENCE AND HIGHER EDUCATION**  **OF THE RUSSIAN FEDERATION**  **Federal State Budget Educational Institution of Higher Education**  **«MIREA – Russian Technological University»** | | | |
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|  |  | APPROVED |  |
|  |  | Rector |  |
|  |  | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ S.A. Kudzh |  |
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| **The main professional educational program**  **of higher education** | | | |
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| Direction of training | 11.04.04 Electronics and nanoelectronics | | |
| Orientation (profile) | Engineering of modern materials for information technology, renewable energy and sensing | | |
| Qualification | Master | | |
| Form of education | Full-time | | |
|  |  |  |  |
| Moscow 2021 | | | |

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| **1.** **Purpose (mission) of the program**  The program aims to develop students' personal qualities, as well as the formation of universal, general professional and professional competencies in accordance with the requirements of FSES HE in the field of training 11.04.04 Electronics and nanoelectronics.  The program includes: curriculum, calendar training schedule, work programs of disciplines (modules), practice programs, as well as a set of evaluation and methodological materials. | |
| **2.** **Regulatory documents**  The educational program has been developed in accordance with the requirements of regulatory legal acts: | |
| ─ | Federal Law of the Russian Federation "On Education in the Russian Federation" dated December 29, 2012 No. 273-FZ; |
| ─ | Federal State Educational Standard of Higher Education (FSES HE) in the field of study 11.04.04 Electronics and nanoelectronics, approved by order of the Ministry of Science and Higher Education of the Russian Federation dated September 22, 2017 No. 959; |
| ─ | The procedure for organizing and implementing educational activities in higher education educational programs - bachelor's degree programs, specialty programs, master's degree programs, approved by Order No. 301 of the Ministry of Education and Science of the Russian Federation dated April 5, 2017 (hereinafter referred to as the Procedure for Organizing Educational Activities); |
| ─ | Professional standard 29.007 Specialist in the design of micro- and nanoscale electromechanical systems  Professional standard 40.006 Process engineer in the field of production of nanoscale semiconductor devices and integrated circuits  Professional standard 40.104 Specialist in measuring parameters and modifying properties of nanomaterials and nanostructures; |
| ─ | Charter of the Federal state Budgetary educational institution of Higher Education "MIREA - Russian Technological University» |
| ─ | Other normative legal acts regulating public relations in the field of education. |
| **3. Scope of the program** | |
| The complexity of the student's development of EP HE in accordance with FSES HE in this direction 120 credits, including all types of classroom (contact) and independent work of the student, practice and time allotted for quality control of the student's development of EP HE. | |
| **4. Duration of training** | |
| The duration of the full-time study program, including vacations provided after passing the state final certification, is 2 years. | |
| **5. Application of e-learning and distance learning technologies** | |
| It is allowed to implement the program using e-learning and distance learning technologies. | |
| **6. Network form of program implementation** | |
| Not used. | |
| **7. Information related to state secrets** | |
| MPEP HE does not contain information constituting a state secret. | |
| **8. Language of training** | |
| Educational activities under the program are carried out in English. | |
| **9. The area of professional activity of the graduate** | |
| Areas and areas of professional activity in which graduates who have mastered the program can carry out professional activities:  40 Cross-cutting types of professional activity in industry | |
| **10. Types of graduate’s professional activity** | |
| Types of professional activity tasks that graduates are preparing for:  scientific research. | |
| **11. Qualifications awarded to graduates** | |
| Graduates are awarded the qualification of "Master". | |
| **12. Условия реализации образовательной программы** | |
| The University legally has the material and technical support of educational activities for the implementation of the educational program in Block 1 "Disciplines" and Block 3 "State final certification" in accordance with the curriculum. A specific list of logistics (including software) is specified in the work programs.  The University provides students with individual unrestricted access to one or more electronic library systems (electronic libraries) and to the electronic information and educational environment of the organization, which meets the requirements of the federal state educational standard. | |
| **13. Information about the teaching staff** | |
| The implementation of the program is provided by the management and teaching staff of the University, as well as persons involved in the implementation of the program on the terms of a civil contract.  The share of the Organization's teaching staff participating in the implementation of the educational program and persons involved by the Organization in the implementation of the master's degree program on other terms (based on the number of substituted rates reduced to integer values), conducting scientific, educational, methodological and (or) practical work corresponding to the profile of the discipline (module) taught, is 70 percent.  The share of teaching staff of the Organization and persons involved in the educational activities of the Organization on other terms (based on the number of substituted rates reduced to integer values) having an academic degree (including an academic degree obtained in a foreign state and recognized in the Russian Federation) and (or) an academic title (including an academic title obtained in a foreign state and recognized in the Russian Federation) is 70 percent.  The share of teaching staff of the Organization participating in the implementation of the educational program and persons involved by the Organization in the implementation of the educational program on other terms (based on the number of replacement rates reduced to integer values), are managers and (or) employees of other organizations engaged in work in the professional field, corresponding to the professional activity for which graduates are preparing (have at least 3 years of work experience in this professional field), is 10 percent. | |
| The qualifications of the University's management and teaching staff correspond to the qualification characteristics established in the Unified Qualification Directory of positions of managers, specialists and employees, the section "Qualification characteristics of positions of managers and specialists of higher professional and additional professional education" approved by the Order of the Ministry of Health and Social Development of the Russian Federation dated 11.01.2011 No. 1n and professional standards (if any).  The average annual amount of research funding per scientific and pedagogical worker (in the rates reduced to integer values) is not less than the value of a similar indicator for monitoring the education system approved by the Ministry of Education and Science of the Russian Federation. | |
| **14. Planned results of the training program mastering** | |
| As a result of mastering the program, the graduate should have universal, general professional and professional competencies. | |
| As a result of mastering the program, the graduate should have universal competencies:  Capable to carry out a critical analysis of problem situations on the basis of a systematic approach, develop a strategy of action (UC - 1)  - Analyzes the problem situation as a system, identifying its components and the relationships between them (UC - 1.1)  - Identifies gaps in information needed to solve the problematic situation; critically assesses the reliability of information sources (UC - 1.2)  Capable to manage a project at all stages of its life cycle (UC - 2)  - Forms a project task based on the problem posed, the way to solve it through the implementation of project management (UC - 2.1)  - Develops a project concept within the framework of the designated problem and a project implementation plan, taking into account possible implementation risks and opportunities to eliminate them (UC - 2.2)  Capable to organize and lead the work of the team, developing team strategy to achieve this goal (UC - 3)  - Develops strategy of teamwork and on its basis organizes the selection of team members to achieve the goal (UC - 3.1)  - Organizes and modifies the work of the team, including on the basis of collegial decisions (UC - 3.2)  Capable to use modern communication technologies, including the foreign language(s) for academic and professional communication (UC - 4)  - Capable of prepare the typical business documentation for academic and professional communication (UC - 4.1)  - Represents the results of their professional activities and participate in discussions in a foreign language (UC - 4.2)  Capable to analyze and take into account the diversity of cultures in the process of intercultural interaction (UC - 5)  - Analyzes the most important ideological and cultural values (UC - 5.1)  - Builds social and professional interaction taking into account the peculiarities of business and general culture of representatives of other ethnic groups and confessions, various social groups (UC - 5.2)  Capable to determine and implement the priorities of his own activities and ways to improve it based on self-assessment (UC-6)  - Assesses his resources and their limits (personal, situational, temporary) for the successful completion of the assigned task (UC-6.1)  - Determines educational needs and ways to improve one's own (including professional) activities based on self-assessment (UC-6.2) | |
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| As a result of mastering the program, the graduate should have general professional competencies:  Capable to present a modern scientific picture of the world, identify the natural science essence of problems, determine ways to solve them and evaluate the effectiveness of the choice made (GPC - 1)  - Reveals the natural science essence of the problem in the field of electronics (GPC - 1.1)  - Determines the solutions and evaluates the effectiveness of the choice made when solving a problem in the field of electronics (GPC - 1.2)  Capable to apply modern research methods, present and argumentatively defend the results of the work performed (GPC - 2)  - Applies modern research methods in the field of electronics (GPC - 2.1)  - Is able to present the results of work (GPC - 2.2)  Capable to acquire and use new information in its subject area, offer new ideas and approaches to solving engineering problems (GPC - 3)  - Uses new information in the field of electronics (GPC - 3.1)  - Offers new ideas and approaches to solving engineering problems in the field of electronics (GPC - 3.2)  Capable of developing and applying specialized software and mathematical software for conducting research and solving engineering problems (GPC - 4)  - Applies modern computer technologies for the preparation of text and design and technological documentation, taking into account the requirements of regulatory documentation (GPC - 4.1)  - Evaluates the optimal software and mathematical support for conducting research (GPC - 4.2) | |
| A graduate who has mastered the program must have professional competencies corresponding to the type (types) of tasks of professional activity tasks that the program is focused on: | |
| **scientific research** | |
| Capable to apply in-depth knowledge of the structure, physical, physico-chemical properties, the purpose of nanomaterials and nanostructures, and methods of measuring their parameters (PC - 1) in professional activity (Defined on the basis of professional standard 29.007 "Specialist in the design of micro- and nanoscale electromechanical systems", generalized labor function "Project support, control of the requirements of the terms of reference for the development of microelectromechanical systems")  - Applies in-depth knowledge of the structure, physical, physico-chemical properties, the purpose of nanomaterials and nanostructures, and methods for measuring their parameters in the field of electronics (PC - 1.1)  - Analyzes the technological problem at the given norms of technological production, highlighting its basic components and searches for reliable information to solve it for various types of queries (PC - 1.2)  Capable to participate in the development and implementation of modern technological processes, the master of new equipment, technological equipment, the necessary modes of production of micro- and nanoelectronics (PC - 2) products (Defined on the basis of professional standard 40.006 "Process engineer in the field of production of nanoscale semiconductor devices and integrated circuits", generalized labor function "Ensuring the functioning of nanoelectronic production in accordance with technological documentation. support and improvement of existing technological processes and necessary modes of production of products manufactured by the organization", generalized labor function "Development and implementation of modern technological processes, master of new equipment, technological equipment, necessary production modes for products manufactured by the organization")  - Participates in the development and implementation of modern technological processes, the development of new equipment, technological equipment, the necessary modes of production of micro- and nanoelectronics products (PC - 2.1)  - Evaluates optimal processes and modes in the development of electronics products (PC - 2.2)  Capable of determining possible physical implementation options, physical and mathematical models of micro- and nanosystems and using software tools for their design and modeling (PC - 3) (Defined on the basis of professional standard 29.007 "Specialist in the design of micro- and nanoscale electromechanical systems", generalized labor function "Development of functional description and technical specifications for the development of microelectromechanical systems")  - Defines possible variants of physical and mathematical models in the field of nanoelectronics (PC - 3.1)  - Uses software tools for designing and modeling electronics elements (PC - 3.2) | |