

**Program: Nuclear Reactors and Materials** (Name of the educational program: "Nuclear reactors") (14.05.01)

**Training Area:** Physical sciences

**Duration:** 5,5 years

**Program supervisor:** Professor Dmitry S. Samokhin., Ph.D, Head of the department of "Nuclear Physics and Engineering", Obninsk Institute for Nuclear Power Engineering of the National Research Nuclear University MEPhI.

**Basic department:** Nuclear Physics and Engineering. The Department is found in 1952 on the initiative of the National Research Nuclear University MEPhI graduated student, the Nobel Prize laureate, academician N. Basov.

### **Goals of the Program**

Training of specialists in the field of development, operation and decommissioning of nuclear power plants for various purposes, as well as research nuclear reactors. The achievement of the designated goal is facilitated by the presence in the curriculum of practices, starting from the second year, at nuclear power plants, as well as research institutes of the Russian Federation. More than 85% of the teaching staff have production experience at nuclear enterprises, more than 35% are current invited employees of enterprises that are part of the Rosatom State Corporation.

The attractiveness of the program is the opportunity to work in an actively developing industry on large government projects, primarily in the field of nuclear power technologies and new generation nuclear installations.

### **Characteristics of the area, objects and tasks of professional activity:**

Areas of professional activity of graduates include:

- Nuclear industry (in the field of using nuclear physics and technologies);

The objects of professional activity of graduates are:

- Nuclear icebreaker fleet;

- Nuclear power plants;

- Floating NPP;

- Sphere of scientific research in the field of nuclear physics and technology.

Types of tasks of professional activity:

- research;

- design.

### **Brief description of the curriculum:**

The curriculum determines the structure of training for the program 14.05.01 Nuclear Reactors and Materials, has a modular structure, containing: General scientific module, Professional module (including general professional disciplines and elective disciplines), Practice (educational and industrial), State final certification (involves preparation for the defense procedure and the defense of the final qualification work) and a set of elective disciplines. Mastering the disciplines of the curriculum and successfully passing the certification guarantees the formation of all the necessary competencies in the graduate: universal, general professional and professional for a qualified solution of problems in the field of modern innovative nuclear technologies.

The main disciplines that provide student training in accordance with the characteristics of the specified educational program are: Materials science and technology of structural materials; Dosimetry and protection from ionizing radiation; Nuclear physics; Nuclear technologies and ecology of the nuclear fuel cycle; Emergency and transient processes in nuclear power plants; Protection calculation methods; Calculation support for the operation of nuclear reactors; Designs of nuclear reactors; Methods and algorithms for solving neutron-physical problems; Commissioning, decommissioning and operation of nuclear power plants; Theory of neutron transport; Quantum mechanics and statistical physics; Physical theory of reactors; Engineering calculations and design of nuclear installations; Legal and international aspects of nuclear non-proliferation; Safety criteria and risk assessment; Experimental Reactor Physics; Fundamentals of management of nuclear power plants; Dynamics of nuclear reactors; Control and protection systems for nuclear power plants; Automatic control systems for nuclear power plants; Mathematical modeling of neutron-physical processes in nuclear power plants; Design and selection of equipment, safety and efficiency of a nuclear power plant; Modeling the states of nuclear power plants; Strength and resources of nuclear power plants; Power equipment of nuclear power plants; Nuclear power plants;

Economics of the nuclear fuel cycle; Economics of nuclear energy.

**Conditions for the implementation of the program:**

The educational organization has the material and technical base for conducting all types of classes and practices provided for by the curriculum for the training program 14.05.01 Nuclear Reactors and Materials. The educational program is provided with the necessary educational and methodological documentation. Students are provided with unlimited access to the electronic information and educational environment of the IATE NRNU MEPhI, access to modern professional databases and information reference systems. Qualification of teaching staff implementing the educational program meets the requirements.

**List of enterprises for internship and employment:**

Education in the field of nuclear reactors and materials is in demand in areas related to the nuclear industry and nuclear fuel cycle enterprises, control and supervision bodies in the nuclear industry, decommissioning of nuclear and radiation hazardous facilities, and management of radioactive waste and spent nuclear fuel. Internships and employment of graduates are possible at many enterprises, including organizations of the State Corporation Rosatom, Rosenergoatom Concern LLC, research institutes and research and production enterprises (JSC RIAR, JSC L.Ya. Karpov, MRRC named after A.F. Tsyba - a branch of the Federal State Budgetary Institution "NMIRC", JSC "SSC RF Physico-Energy Institute named after A.I. Leipunsky", LLC NPP "RADIKO", JSC "NIKIMT-Atomstroy" and other engineering companies ).