Nanobioengineering

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: **196 820 rubles per semester**

Programme curator: **Zavestovskaya I.N.**
Tel.: **Contact name: Olga N. Petukhova, Phone number. +74957885699, ext. 8045.**
E-mail: ONPetukhova@mephi.ru

Goals of program: Training of specialists in nanomedicine, in particular, in the designing, fabrication, and use of advanced medical nano- and microtools for targeted delivery of therapeutic agents, programmed and controlled drug release at the sites of lesion, as well as medical imaging and nanostructure-sensitized targeted irradiation of affected areas from external sources, who could work under the conditions of rapid development of new medical technologies, which should ensure high demand for these specialists on the labor market.

Graduate department: Department of laser micro and nanotechnology (№ 87), Laboratory of Nano-Bioengineering

Occupational area: Medicine, medical micro- and nanotechnologies, laser and radiation technologies, bioinformatics, diagnostic methods based on obtaining and processing large arrays of diagnostic information, methods of development and use of medical nano- and microtools for diagnosis and treatment, designing of medical equipment for nanomedicine using advanced methods of imaging and targeted treatment, and development and use of instruments for real-time monitoring of treatment efficacy and appropriateness of the therapeutic strategy.

Objects of professional activity: Diagnostic and therapeutic nano- and microtools, the equipment ensuring their effective use, and the methods of nanomedicine, including the engineering of diagnostic microsystems for simultaneous recording of many disease markers, systems for collecting and treating large arrays of information, development of new diagnostic approaches taking into account individual characteristics of patients and diseases, development of advanced types of nanodrugs intended for the use together with microstructures for their targeted delivery and controlled release and activation at the target areas, and development of methods for real-time monitoring of treatment.

Specific characteristic of the curriculum: The training is based on the combination of in-depth training in basic physics, mathematics, and engineering. The curriculum of the master's course includes, along with the mandatory basic part, unique, original special courses corresponding to the forefront of science: nanophotonics; physics of micro- and nanostructures; physics and chemistry of molecular and supramolecular nanosystems; spectral and probe methods of nanostructure analysis, as well as imaging of various types of nanostructures and targeted influence on them; biomedical engineering; and development of nanostructures for biomedical applications. Practical training and the graduation projects are carried out using advanced medical and technological devices and instruments, including unique ones. Leading academics and researchers from Russian institutes, including Blokhin Russian Cancer Research Center of the Ministry of Health of the Russian Federation and the Shemyakin–Ovchinnikov Institute of Bioorganic Chemistry of the Russian Academy of Sciences, and foreign research and education centers will be engaged in both teaching and the supervision of masters' graduation projects. The students have excellent opportunities of participating in numerous international conferences and research projects, working as interns in leading foreign research centers, and actualizing their potential in implementing the results of their research into the development of new materials and devices.

The curriculum includes the following disciplines: Nanophotonics; Physics of Micro- and Nanosystems; Principles of the Physics of Molecular Nanosystems; Spectral Methods in the Study of Nanostructures; Biomedical Engineering; and Nanoparticles for Biomedical Applications. The training is planned to be carried out in Russian and in English, with foreign professors engaged in lecturing and distance learning technologies used. Part of the curriculum is also

implemented in English.

List of institutions for practical training and possible employment of the graduates: Blokhin Russian Cancer Research Center of the Ministry of Health of the Russian Federation; Shemyakin–Ovchinnikov Institute of Bioorganic Chemistry of the Russian Academy of Sciences; leading foreign universities and research centers.

Specializations within this programme