

Advanced Semiconductor Lasers and Technology (in English)

National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)

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

Language of study: **English**

Mode of study: **full-time**

Duration: **2 years**

Availability of free education: **yes**

Price: **196 820 rubles per semester**

Programme curator: **Irina N. Zavestovskaya**

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Direction of training: "Nuclear Physics and Technology".

Duration of training: 2 years, 120 credits.

Course delivery language: russian & english.

Basic department: Semiconducting Quantum Electronics (No. 88).

Basic organizations: P. N. Lebedev Physical Institute of the Russian Academy of Sciences (LPI RAS), NPP "Inject" (Izhevsk, Russia).

Partner universities: University of Rochester (USA), Tampere University of Technology (Finland).

Information about the leader of the program: Oleg N. Krokhin, Head of the Department, Full member of the Russian Academy of Sciences (Academician), Doctor of Sciences, Professor, prominent physicist and organizer of science, laureate of Lenin and State Prizes, Editor-in-Chief of Quantum Electronics, Scientific advisor of the Mastership division of MEPhI.

The goal of the program (brief description of the program), focused on solving problems of the industry. The purpose of the program is to train the mastership students for activities related to quantum electronics, photonics, interaction of radiation with matter, laser technologies, R&D of semiconductor laser components and devices, and applications of these devices in electronics, medicine, technology and other areas.

Competitive advantages of the program. The program is based on the close scientific cooperation between P. N. Lebedev Physical Institute and Partner Universities. Throughout the whole training period, the students attend the course "Scientific seminar: modern studies on advanced fields of science and technologies". The course includes lectures presented by leading foreign scientists both immediately in MEPhI and via distance learning. The latter can be also routed to other Partner Universities. The courses are developed by leading researchers specialized and having wide experience in the development of semiconductor lasers and their application, both in P. N. Lebedev Physical Institute and Partner Universities.

Characteristics of the scope and objects of professional activity of graduates. The curriculum is organized so that the graduates obtain a wide spectrum of competences allowing them to perform the basic research and solve applied problems in the fields of laser physics, physics of semiconductors, solid state, plasma, fast processes, interaction of radiation with matter, control systems and automatic control.

Brief description of the curriculum (the features and benefits).

The first year of education is conducted at MEPhI, when the main courses of the FGOS3 "Nuclear physics and technologies" are taught, as well as the specialty courses. Large attention is devoted to improve the knowledge of English language for subsequent passing the TOEFL exams.

The second year includes both training at MEPhI and at the Partner University. The curriculum is composed in such a way that students can vary their education trajectory, take their courses from either MEPhI or the Partner University, as well as vary their study at the Partner University from one to two semesters.

The curriculum includes the distance learning courses translated from MEPhI or the Partner University.

The base for industrial and/or scientific practice. The bases for the industrial and scientific practices are the Partner Universities, P. N. Lebedev Physical Institute of the Russian Academy of Sciences (LPI RAS), NPP "Inject" (Izhevsk, Russia), and other institutions and laboratories of RAS performing research in the same field in collaboration with European and American universities and scientific companies.

The specialty courses are subdivided to the following modules:

- semiconductor lasers, with the course of the same title as well as High-power single diode lasers, Quantum cascade lasers, Semiconductor disk lasers – 9 credits;
- heterostructure technology: Physics of the heterostructures, Technology of the heterostructure growth, Physical fundamentals of the semiconductor laser technology – 10 credits;
- interaction of radiation with matter, with the course of the same name, plus Physical optics, Modern optics, Modern photonics, Theoretical quantum electronics, Fiber optics and fiber lasers, Integrated optics, Solid-state lasers with diode pumping – 22 credits;
- scientific & research practice: Research practice, Scientific-industrial practice, Pre-dissertation practice – 11 credits.

Specializations within this programme