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**MASTER'S PROGRAM "THERMOELECTRIC ENERGY CONVERSION"  
AT ITMO UNIVERSITY**

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In September 2013 at Saint-Petersburg National Research University of Information Technologies, Mechanics and Optics (ITMO University), for the first time in the Russian Federation, training of masters started in the program 141200.68.04 "Thermoelectric energy conversion".

ITMO University is one of the oldest educational institutions in Russia. 2010 marked 110 years since the date of adoption of the decision by the State Council of Russian Empire "On the foundation of a Mechanics, Optics and Watchmaking Department in the Prince Nicholas Vocational School". The University is a successor of Leningrad Institute of Fine mechanics and Optics (LIFMO). In 2009, based on the results of competitive selection by the Ministry of Education and Science of the Russian Federation, the university gained the status of "national research university".

ITMO University is one of 15 leading Russian universities. Students take training at 18 departments, institutes and academies. Full-time department trains bachelors in 31 majors and 94 specialties, and correspondence department – in 27 majors. 190 master's programs in 32 majors are implemented at ITMO University.

Master's program "Thermoelectric energy conversion" has been organized and supervised by the Electrical and Electronic Engineering Chair together with the Physics of Thermoelements Laboratory, Ioffe Physical-Technical Institute. Most qualified instructors, including those from Ioffe Physical-Technical Institute, have been involved in training of master students.

Master's course can be entered by persons with bachelor's or specialist degrees.

Total duration of teaching is 2 years (4 terms), that is, 104 weeks, 120 ECTS (European Credit Transfer and Accumulation System), including:

- theoretical classes, including examinations - 60 ECTS;
- practice - 12 ECTS or 432 hours;
- research work - 24 ECTS or 864 hours;
- doing master's degree - 14 ECTS or 504 hours;
- State Final Examination - 2 weeks (10 ECTS).

The curriculum is oriented at research and developments in the area of thermoelectric coolers and generators, thermoelectric materials, including their nanostructuring and properties measurement. The curriculum includes the following majors and elective courses:

- Requirements to thermoelectrics and their classification.
- Methods for the production of thermoelectrics.
- Thermoelectric nanostructures.
- Methods for measurement of thermal conductivity.
- Methods for measurement of electric conductivity and the Seebeck coefficient.
- Direct energy conversion and renewable energy sources.
- Solid-state cooling methods.

- Simulation of temperature and electric fields in thermoelectric systems.
- Thermoelectric cooling modules and systems and their manufacturing technique.
- Calculation principles of thermoelectric coolers.
- Thermoelectric generator modules and systems, low-grade heat recovery.
- Calculation principles of thermoelectric generators.
- Computational fluid dynamics, heat-mass exchange and computer engineering.
- Special chapters of thermodynamics of low-temperature systems.
- Development prospects and applications of low-temperature systems and plants.
- Philosophy and methodology of scientific cognition.
- Business foreign language.
- Practical course of professionally-oriented translation.

Master's students use the unique and expensive equipment of the ITMO University and of the Physics of Thermoelements Laboratory, Ioffe Physical-Technical Institute. These are various benches for measurement of thermoelectric parameters by different methods in the temperature range of (80 –1300) K; technological equipment, including that for production of the bulk nanothermoelectrics; structural test facilities.

Master's students receive work experience in the Physics of Thermoelements Laboratory, Ioffe Physical-Technical Institute, carry out scientific investigations in the International scientific laboratory of direct energy conversion and nanoengineering of thermoelectric structures.

During the period of studies master's students can undergo training in one of the universities of Europe.

We are interested in cooperation with leading foreign universities in the area of training masters and PhDs in thermoelectricity, in particular, in creation of joint master's and postgraduate programs.

Substantial aid in the development of curriculum and work programs of master's program "Thermoelectric energy conversion" has been rendered by Department of Thermoelectricity and Physical Metrology of Chernivtsi National University (Ukraine) and Institute of Thermoelectricity of the National Academy of Sciences and Ministry of Education and Science of Ukraine. We express deep appreciation to members of Department of Thermoelectricity and Physical Metrology of Chernivtsi State University and personally to Professor Lukyan Anatychuk.