

Physics

National Research Tomsk Polytechnic University

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

Language of study: **English**

Mode of study: **full-time**

Duration: **2 years**

Availability of free education: **no**

Price: **227 000 RUB / year**

Programme webpage at the university website:

https://tpu.ru/en/admissions/our_programs/graduate/graduate_degree_in_eng

Programme curator: **Andrey LIDER, PhD**

Tel.:

E-mail:

Introducing Your Degree:

Condensed matter physics attempts to understand and manipulate the properties of matter in its solid and liquid forms. Condensed matter physics is one of the most active and exciting research area in sciences and technological applications. Condensed Matter Physics master degree graduates are not only physicists, they could be proficient in chemistry, medicine, computer programming, engineering, and much more.

Program overview:

TPU Physics actively engages with large-scale research institutions, industrial partners to ensure the industrial relevance of all its activities and facilitate training of highly qualified specialists for a wide range of enterprises representing all stages of the technological chain of nuclear fuel cycle, power engineering, mechanical engineering and other research intensive branches of industry. Our graduates will be able to (in relation to the chosen specialization):

- apply and develop new techniques for experimental investigations of condensed matter structure and properties; construct designs of and conduct computing experiment to use mathematical modeling and perform practical application of research results;

- work at enterprises engaged in high tech production which deploys plasma and radiation technologies; conduct research in the fields of physics related to the impact of

plasma and charged particles beams on the matter;

- perform and be in charge of operations, reliable service and preventive maintenance, diagnostics of technical state and equipment repairs for enterprises of condensed natural gas technologies; design an enterprise implementing condensed natural gas technologies.

Solid fundamental knowledge of our graduates is complemented with high level of competence gained through direct experience of working with enterprises that jointly ensures guaranteed employment – the number of job placements offers from enterprises for our master degree graduates in physics surpasses the number of our graduates.

Main modules:

Condensed Matter Physics

Defects in Solids and Materials Modification

Hydrogen Accumulating Properties in Metals and Alloys

Solids Analysis Instrumentation and Equipment

Accelerators for Scientific, Industrial and Medical Applications

Academic staff:

Panin A.V. Professor, Doctor of Science

Larionov V.V. Professor, Doctor of Science

Tyurin Y.I. Professor, Doctor of Science

Nikitenkov N.N. Professor, Doctor of Science

Kryuchkov Y.Y. Professor, Doctor of Science

Chernov I.P. Professor, Doctor of Science

Program Head: Andrey Lider, PhD, Associate Professor within the Engineering School of Nuclear Science and Engineering

Learning outcomes:

Upon completing the program master degree graduate in Condensed Matter Physics will be able to:

- work in the advanced fields of professional activities: hydrogen engineering, nanotechnologies, nuclear engineering, energy-saving technologies and others;
- perform studies of defects in solids, radiation effects in condensed media;
- apply methods of nuclear analysis of solids, isotope analysis, chemical and structural analysis using atomic physics methods;
- develop mathematical and computer models of studied physical phenomena;
- identify, gather and systematize necessary data and information in the field of professional activities using modern information resources and research methods applicable in condensed matter physics; construct designs of research investigations, perform economic design; marketing forecasting and perform management of the projects under development;
- network with home and international partners, perform effective spoken and written communication in a foreign language with regard to cultural, linguistic and socio-economical background to establish successful international partnerships.

Career opportunities:

Condensed Matter Physics master degree graduates are in demand with educational, research and development institutions, as well as with high tech companies and enterprises engaged in hydrogen engineering, space technology, electronics, material studies and other fields, working in Russia and abroad including People`s Republic of China, India, Korea and other countries.

Laboratory facilities:

- Automatic Vickers hardness testers
- Testing machine ComTen-95 for mechanical properties
- Controlled gas reactors for hydrogen and other gases interaction with metals and alloys analysis;

- Stand for hydrogen saturation of metals in electrolyte;
- Optical emission spectrometer for quantitative and qualitative elemental analysis;
- Analyzer for hydrogen quantitative analysis in metals;
- Electron-positron annihilation spectroscopy stand
- Optical microscopes
- X-ray diffractometer for analysis of materials crystal structure;
- Ultrasound testing stand;
- Secondary ion mass spectrometry instrument for materials surface layers analysis;
- Magnetron Sputtering System for coating technologies;
- Instrumentation for hydrogen content measurement and analysis of radiation-enhanced and thermostimulated hydrogen release;
- X-ray fluorescence spectrometer for matter composition analysis.

Modules:

GENERAL SCIENTIFIC SUBJECTS SERIES

STANDARD PART

- Philosophical and Methodological Problems in Science and Engineering
- Special Practicum in Physics

VARIABLE PART

- Professional English Training
- Mathematical Treatment of Measurement Results
- Accelerators for Scientific, Industrial and Medical Applications
- Isotope Separation Methods
- Surfaces and Thin Films
- Experimental Studies of Heat Mass Exchange and Gas-dynamic Processes
- Nuclear Engineering Technologies
- Theory and Properties of Crystals and Disordered Materials
- Physicochemical Basics of Heat Mass Exchange
- Computer Technologies in Science and Education
- Mathematical Modeling of Physical Phenomena

PROFESSIONAL SUBJECTS SERIES

STANDARD PART

- Current Issues of Physics
- Methodological Problems in Modern Science

VARIABLE PART

- Foundations of Computed Tomography
- Nuclear Materials Accountancy and Control
- Isotope, Chemical and Structural Surface Analysis with Atomic Physics Methods
- Monte-Carlo Method in Irradiation Transition Theory
- Water Treatment in Nuclear Industry Enterprises
- Plasma and Charged Particles Beams Impact on the Matter
- Mathematical Modeling of Dynamic Systems
- Condensed Matter Physics
- Defects in Solids and Materials Modification
- Hydrogen Accumulating Properties in Metals and Alloys
- Radiation Effects in Condensed Media
- Solids Analysis Instrumentation and Equipment
- Computer Modeling of Physical Phenomena
- Scanning Probe Microscopy
- Charge Particles Beams Generation and Application

Specializations within this programme

Condensed Matter Physics