

**Nuclear Power Engineering
(Nuclear Power Installations Operation)**

Degree level:	Master in Nuclear Physics and Technology
Specialization:	Nuclear Power Engineering (Nuclear Power Installations Operation)
Delivery mode:	Full-time
Language of instruction:	English
Program duration:	2 years (120 ECTS), the program starts on September, 1
Entrance requirements:	<ul style="list-style-type: none"> • Academic Entry Requirements: Bachelor / Master degree in Physics, Theoretical Physics, applied physics, and nuclear engineering; • English Language Requirements: certificate TOEFL (paper-based 500 and higher; iBT 55 and higher) or IELTS (5.5 and higher), First Certificate in English (FCE)
Tuition fee per year:	302 220 RUB

Tomsk Polytechnic University has the 60-year history in training specialists in a number of fields, including mining and processing of uranium ore, reprocessing and storage of spent nuclear fuel and related fields.

One of the remarkable features of the program is that TPU built close collaboration with Russia's State Atomic Energy Corporation Rosatom, allowing conducting industrial internship at its facilities. Along with this, the University provides international students with a unique opportunity to conduct research at facilities of its nuclear research reactor, the one and only in Siberia, and one of the few in Russia. It gives students important experience and skills, significantly boosting their professional level and competitiveness in the international labor market.

The research topics generally include studies of operational modes, in-core systems and controls, material properties, technologies of nuclear doping of silicon and the production of isotopes for medical purposes, including different forms of radiopharmaceuticals.

Program overview

The Master program offers students an extensive and detailed education in the key areas related to nuclear technology. The program aims to prepare students to engineering careers in the atomic fields that require specialized knowledge and

skills. In general, the program allows graduates both to work in industry or research areas.

The program provides its graduates with the advanced knowledge and skills, required to operation of nuclear power plants. Students are engaged in advanced studies of particular research problems, such as development of perspective materials for nuclear fuel cycle, improving the operational characteristics of nuclear installations and equipment that that requires solid theoretical and applied skills. The academic program is conducted by the qualified international faculty with excellent experience both in research and production activities.

Main modules

- Reactor Physics
- Control and Safety of Nuclear Reactor
- Nuclear Reactor Design Project
- Design, Maintenance and Engineering of Nuclear Power Plants
- Laboratory at of the Nuclear Research Reactor

Academic staff

- Vladimir I. Boyko, Sc.D Professor
- Petr M. Gavrilov, Sc.D, Professor

Laboratory facilities

- Research nuclear reactor IRT-T
- Reactor analytical simulator complex
 - ✓ NPP with VVER-1000 and BN-800 reactors
 - ✓ Main coolant pump and its assisting systems
 - ✓ Cooling circuit of control and protection system
 - ✓ Feedwater heating system
 - ✓ Main condensation system
 - ✓ Protection and locking of NPP general systems equipment
- Modern spectroscopic complexes (Canberra Ind.)
- Analytical complex for security systems, identification devices, means of detection and video recording
- Laboratory of Radiation Sources Research
- Laboratory of Nuclear Power Installations Processes Modelling
- Laboratory of Nuclear and Radioactive Materials Analysis
- Laboratory of NPP Materials
- Laboratory of Thermal Hydraulic Processes Research in NPP Equipment
- Laboratory of Modelling Processes in NPP Equipment

- Software and Methodological Resource Base: MCU5TPU, WIMS, MCNP

Learning outcomes

By the end of the study, graduates are expected to:

- apply deep, mathematical, scientific, socio-economic and professional knowledge for theoretical and experimental research in the field of nuclear energy, nuclear materials and nuclear power installations
- develop new and original ideas and design methods for solving engineering problems in areas, related to nuclear fuel cycle, modernization and improvement of its advanced technological chains
- plan and carry out analytic, modeling and experimental research in the nuclear fields relying on the latest achievements of science and technology
- assess the prospects of the development of nuclear industry, analyze radiation risks and scenarios of potential accidents, develop measures to reduce risks and ensure nuclear and radiation safety in compliance with international laws and regulations, as well as make expert decisions
- acquire practical working experience at the nuclear research reactor

Career opportunities:

After graduation the students will be equipped with necessary knowledge and skills to work in the area of nuclear power engineering and related fields.

Career fields and types of organizations:

- Nuclear power plants
- Regulatory bodies in the area of nuclear control
- Educational institutions
- Research institutions

Positions: engineer, lecturer

Internships: TPU premises (nuclear research reactor, laboratory facilities), ROSATOM enterprises

Postgraduate opportunities (Further Studies):

Graduates are offered opportunities for further education in TPU: postgraduate study.

Program structure:

№	Modules	Credits
Semester 1		
1	Economics	3
2	Professional English/Russian Language	3
3	Nuclear Physics	3
4	Special Chapters of Advanced Mathematics	3
5	Thermal Hydraulics in Nuclear Reactors	4
6	Thermodynamics	4
7	Dosimetry and Protection From Ionizing Radiation	2
8	Materials of Nuclear Power Plants	4
9	Research Work	3
Semester 2		
1	Professional English/Russian Language	3
2	Fundamentals of Nuclear Fuel Cycle	3
3	Turbine Installation	3
4	Steam Generators for Nuclear Power Plants	6
5	Reactor Physics	4
6	Nuclear and Radiation Safety	4
7	Research Work	2
8	Scientific Research Practical Work	6
Semester 3		
1	Design, Maintenance and Engineering of Nuclear Power Plants	4
2.1	Nuclear Reactor Design Project	4
2.2	Steam Turbines Design Project	4
3	Control and Safety of Nuclear Reactor	4
4	Development of Basic Solutions for NPP Construction Team Project	4
5	Reactor Kinetics and Control	4
6	Lab Practicum	4
7	Research Work	3
8	Scientific Research Practical Work	9

Program Head

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