

National Research Nuclear University MEPhI

Program	<i>Nuclear Power Plants</i>
Educational area	14.04.01 Nuclear Power Engineering and Thermal Physics
Degree	Master degree
Duration	2 years
Graduate department	Nuclear Physics and Technology - Obninsk Institute for Nuclear Power Engineering
Program leader	Dr. Sergey Leskin, professor
ECTS	120

Description

The goal of the graduate program “Operation of nuclear power plants and installations” is providing a balanced education in the field of nuclear power plant (NPP) design and operation. This educational program enables a university graduate to work in many professional areas related to nuclear technologies, design and operation of nuclear power installations intended for different applications, NPPs, thermal physics energy installations.

The curriculum covers a variety courses including computer technologies for science and education, economics of research and development, theoretical and experimental studies in thermal physics, innovations in nuclear power generation, NPP equipment diagnostics, supervisory control and data acquisition systems of NPP (SCADA NPP), basic safety principles for nuclear power plants.

The practical field experience is an essential part of the educational program. The curriculum includes 12 weeks of practical training during the first year of study and 24 weeks during the second year. Places of practical training are nuclear power plants and research centers.

The balanced curriculum and high standard of teaching enable the university students who complete this degree program to pursue positions in the main NPP subdivisions and at nuclear research centers.

Curriculum

First Year - 1 semester

4 compulsory courses semester. Each course is for 2 credit hours. The compulsory course ends with the exam.

1. Theory of Neutron Transport /
Advanced Reactor Analysis
2. Design of Nuclear Power Plants
3. Modeling and Simulation in Nuclear Engineering /
Numerical Methods in Nuclear Engineering /
Computer Codes Reactor Analysis
4. Nuclear Reactor Thermal Hydraulics

First Year - 2 semester

4 compulsory courses semester. Each course is for 2 credit hours. The compulsory course ends with the exam.

1. Nuclear Reactor Safety /
Advanced Reactor Safety
2. Nuclear Materials /
Nuclear Fuel Management
3. Environmental Aspects of Nuclear Energy /
Environmental Nuclear Pollution
4. Reactor Measurements and Control/
Economics of Nuclear Power Plants/
Non-Destructive Testing /
Radiation Detection Lab /
Radiation Detection Techniques /
Radiation Protection/
Waste Management/
Transportation and Management of Radioactive Materials

Second Year – 3 and 4 semesters

5 compulsory courses semester. Each course is for 2 credit hours. The compulsory course ends with the exam.

1. Operation of Nuclear Power Plants (lectures + practice on the analytical NPP simulator)
2. Passive safety systems of NPP
3. Nuclear Reactors Dynamics
4. Nuclear Reactors Nuclear Reactors Kinetics
5. Heat-engineering equipment (turbomachinery, pumps, heat exchangers) — lectures + labs or course project.

Practice

Practice can be organized at MEPHI Resource Centers, Volgodonsk and Novovoronezh Resource Center could be considered as preferable (with practice on the full-scale NPP simulator and a technical tour on Unit 6 of Novovoronezh NPP with VVER-1200 reactor).

Practice duration – from 2 to 4 weeks.

Practice can be arranged on

1. First semester (November or December) or
2. Fourth semester (in range February – May)

Master thesis

Student has to work on his master thesis during all 2 years, from the 1st semester 1 supervisors from MEPHI University.

The research work (preparing Master thesis) should be for 2 credit hours at least for each semester during two years.

Defense of Master thesis can be arranged at MEPHI University (June – July after the 2nd year).

Timetable for semesters

First Year - 1 semester	(1 September – 31 January)
First Year - 2 semester	(1 March – 31 July)
Second Year - 3 semester	(1 September – 31 January)
Second Year - 4 semester	(10 February – 10 July)