

ENERGY AND PHYSICS OF REACTORS

Master of Science

Nuclear Energy

Concentration in Nuclear Reactor Physics and Engineering

INSTITUTION(S)

Institut Polytechnique de
Paris
INSTN
Paris-Saclay University

**DURATION
OF STUDY** Two-year programme

LANGUAGE 

**TRAINING
LOCATION** Gif-sur-Yvette
Orsay
Palaiseau
Paris



**MODE OF
STUDY** • Continuing education
• Full time programme

CONTACTS gael.sattonnay@universit
e-paris-saclay.fr

WEB www.universite-paris-sacl
ay.fr
www-instn.cea.fr
www.ip-paris.fr

PREREQUISITES

Students from scientific university courses, in France or abroad, who have validated 180 ECTS (Bachelor degree in physics, chemistry, mechanics, or Nuclear Engineering).

Student engineers from engineering schools who have validated their first-year.

SUMMARY

The Master in Nuclear Energy (MNE) is a two-year master degree programme taught exclusively in English. It aims to train high-level experts to meet current and future needs of the nuclear industry: performance optimization of the current reactor fleet, design of third-generation facilities, development of advanced processes and Generation IV reactors, operation of current reactors and facilities, dismantling of facilities, reprocessing of spent fuel, nuclear waste management, etc.

The first year consists of core courses with a specialization in either physics or chemistry.

The second year, different concentrations are available to students: Fuel Cycle (**FC**), Decommissioning & Waste Management (**DWM**), Nuclear Plant Design (**NP**), Nuclear Reactor Physics & Engineering (**NRPE**), or Operations (**OP**).

Second year - M2 Nuclear Reactor Physics & Engineering (NRPE)

concentration: the NRPE track allows the acquisition of the knowledge and skills necessary to master the physics of reactors through a set of courses and practical work taught by researcher-teachers (CEA, CNRS and Université Paris Sud). The student learns to use calculation codes (neutronics, thermal-hydraulics, materials), to follow practical work on a PWR operating simulator and on a teaching reactor (ISIS reactor at CEA/Saclay). A nuclear engineering module including lessons in radiation protection and criticality safety completes the operational dimension of the curriculum. Visits to industrial sites (EDF, Framatome) and research facilities (CEA, CNRS) allow students to develop their career plans.

The NRPE master degree is accredited by the I2EN and awarded the I2EN Label.

SKILLS

- Develop and qualify simulation tools to take into account the multi-physics of reactor operation;
- Use nuclear calculation codes (basic neutronics studies, thermal-hydraulic studies of cores and systems);
- Analyze criticality safety and radiation protection issues;
- Design nuclear reactors (neutronics, thermal-hydraulics, materials and fuel cycle);
- Know how to operate nuclear structures and infrastructures, thanks to the knowledge acquired in nuclear physics.

CAREERS

- Equipment design and construction engineers;
- Nuclear boiler systems engineer at suppliers/builders (Framatome, General Electric, Toshiba...), at EDF, ENGIE... ;
- Engineers in research organizations such as CEA, CNRS;
- Researchers in the research laboratories of safety and radioprotection institutions;
- R&D engineer.

TRAINING FACILITIES

- Use of nuclear calculation codes in thermal-hydraulics, neutronics;
- Use of PWR operation simulator;
- Practical work on a nuclear teaching reactor and on particle gas pedals.