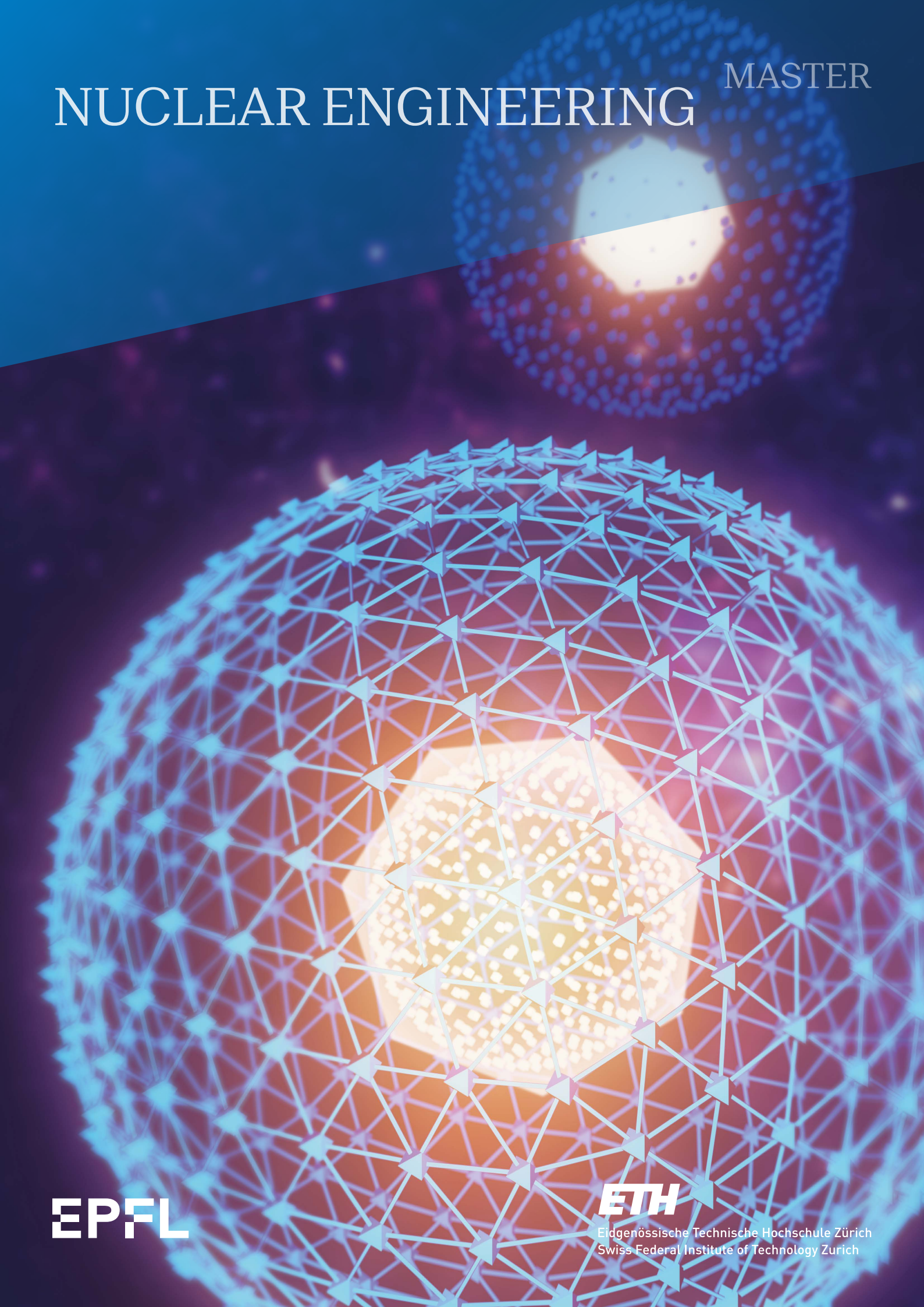
NUCLEAR ENGINEERING

MASTER



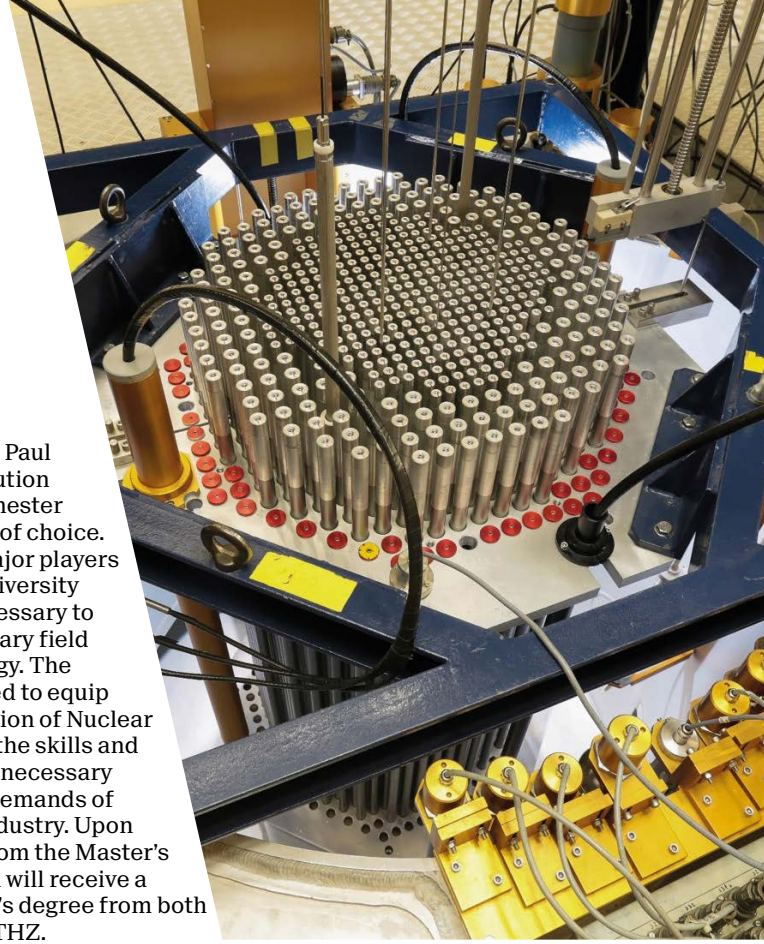
EPFL

ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

The application of nuclear and radiological sciences constitutes a major industrial and research domain. Nuclear engineers tackle 21st century challenges in energy production from fission and fusion, medical imaging, radiotherapy, nuclear safeguards, radiation detection, particle acceleration, and many others.

Nuclear technology: Harnessing the power of the nucleus for society

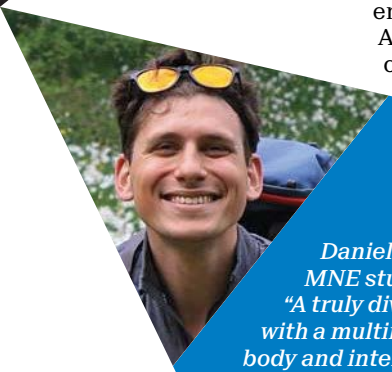


The Master's program in Nuclear Engineering is the only program offered collaboratively by EPF Lausanne, ETH Zürich, and the Paul Scherrer Institute (PSI). It is divided between each institution on a semester-by-semester basis, with the final semester consisting of a Master's thesis at the institute of choice. The combination of these three Swiss major players in research give you access to the diversity of expertise and facilities necessary to master the interdisciplinary field of nuclear technology. The courses are aimed to equip the next generation of Nuclear Engineers with the skills and understanding necessary to satisfy the demands of the nuclear industry. Upon graduating from the Master's program, you will receive a joint Master's degree from both EPFL and ETHZ.

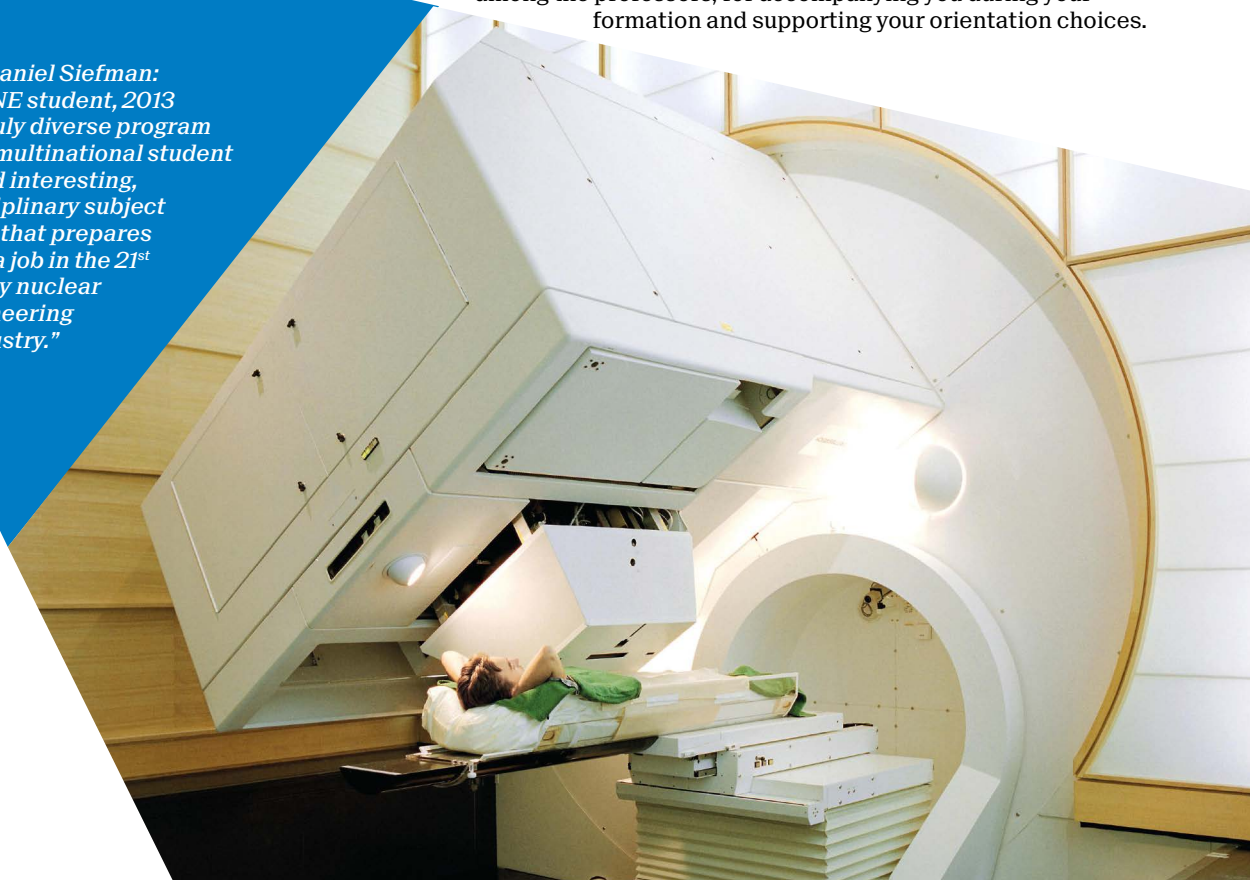
Marianna Papadionysiou: MNE student, 2015
"This program was an amazingly interesting experience. It covers all aspects of nuclear engineering, providing theoretical and hands-on knowledge and gives the students the chance to meet people from different countries and cultures."

Engineering at the crossroad of sciences

The coursework covers all major aspects of the nuclear industry, from nuclear power, to medical imaging, radiation therapy, and detection technologies. It is a multidisciplinary course with emphasis on all aspects of radiation applications for 21st century challenges, including climate-friendly energy production and innovative medical techniques. It is well suited to train graduates of physics or engineering degrees. You will gain scientific and technical knowledge, and practical know-how. A mandatory three-month internship in nuclear industry, and a Master's thesis in research or industry complete the educational program. The small class size of approximately 15 to 20 students allows hands on experience in world-class facilities, and close contact with the faculty. The core and supplementary modules are taught by laboratory directors and leading researchers, and selected professionals from industry. You will be choosing a tutor among the professors, for accompanying you during your formation and supporting your orientation choices.



Daniel Siefman: MNE student, 2013
"A truly diverse program with a multinational student body and interesting, multidisciplinary subject material that prepares you for a job in the 21st century nuclear engineering industry."

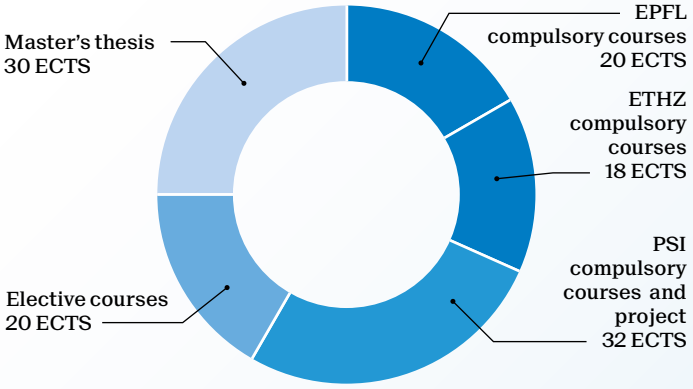


Joint Master of Science in

NUCLEAR ENGINEERING

EPF Lausanne - ETH Zürich

2-year program - 120 ECTS



- 1st semester at EPFL
- 2nd semester at ETHZ
- 3rd semester at PSI (Paul Scherrer Institute)

	Credits
EPFL compulsory courses	**20**
Course of entrepreneurship	4
Physics of nuclear reactors	6
Radiation and reactor experiments	6
Radiation biology, protection and applications	4
ETHZ compulsory courses	**18**
Fuel cycle and waste management	4
Nuclear fuels and materials	4
Reliability engineering and quantitative risk analysis	4
Technology and safety of nuclear power plants	6
PSI compulsory courses and project	**32**
Advanced topics in nuclear reactor materials	4
Beyond-design-basis safety	4
Decommissioning of nuclear power plants	4
Engineering internship	8
Nuclear computations lab	4
Semester project	8
Elective courses	**20**
Elective project	8
EPFL elective courses	
Energy conversion and renewable energy	4
Experimental methods in physics	3
Hydraulic turbomachines	4
Image processing I	3
Introduction to medical radiation physics	4
Introduction to particle accelerators	4
Modeling and optimization of energy systems	4
Neutron scattering -theory and applications	4
Nuclear fusion and plasma physics	4
Nuclear interaction: from reactors to stars	4
Numerics for fluids, structures and electromagnetics	5
Plasma I	6
Radiation detection	3
ETHZ elective courses	
Advanced techniques for the risk analysis of technical systems	4
Biomedical imaging	6
Computational multiphase thermal fluid dynamics	4
Computational neuroimaging clinic	3
Electrochemical energy conversion and storage technologies	4
Introduction to quantum mechanics for engineers	4
Magnetic resonance imaging in medicine	4
Materials analysis by nuclear techniques	6
Medical physics II	6
Micro and nano-tomography of biological tissues	4
Monte Carlo in medical physics	4
Multiphase flow	4
Physics against cancer: the physics of imaging and treating cancer	6
Physics of nuclear reactor II	4
Radiation imaging for industrial applications	4
Therapeutic applications of particle physics: principles and pratice	6

Career prospects

After graduation, the Master of Nuclear Engineering's students will have the perfect profile to start a career in industry, research institutes and national authorities, in Switzerland and abroad. Your internationally recognized degree, and experience from the cultural life in two attractive and diverse cities of Switzerland, allows you to become a well-recognized member of the international community of nuclear engineers. If you are interested in an academic career, the Master of Nuclear Engineering is also an ideal stepping stone to join a PhD program in nuclear engineering implemented as an EPFL-ETHZ-PSI collaboration.
Career options are as wide as follow: Development of Generation IV reactors / Medical imaging / Instrumentation for fusion technologies / Accelerator driven systems for transmutation / Spallation neutron sources / Safety of light water reactors / Environmental monitoring / Radiation protection / Reprocessing and partitioning / Computational fluid dynamics / Neutron transport modeling / Development of two-phase flow instrumentation / New nuclear fuel materials, and many others.

Admission Guidelines

You are: A Bachelor student of Science in Mechanical Engineering, Physics, Chemistry, Electrical Systems or similar / ready to work interdisciplinary / concerned about sustainability / interested in power engineering, biomedical applications, nuclear physics, thermal fluid dynamics, material sciences, radiation detection, and energetic aspects. The following required admission profile is expected to be met by the largely common elements of the first years of university education in science and engineering:

- Minimum required credits in "Mathematics": 18 ECTS or equivalent hours/week
- Minimum required contents in "Natural Sciences": 12 ECTS or equivalent hours/week
- Minimum required contents in "Engineering Sciences": 12 ECTS or equivalent hours/week

Fluency in English is required, since all courses are being taught in English. Success in an international examination of English such as the TOEFL is a plus but not mandatory for the admission to the MNE.
Applications can be submitted online twice every year, from November 15 to December 15 and from December 16 to April 15, through EPFL or ETHZ procedures.
If you need a visa to study in Switzerland, we recommend that you apply for the December deadline in order to allow for the completion of the visa procedure, which can take up to three months.

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