



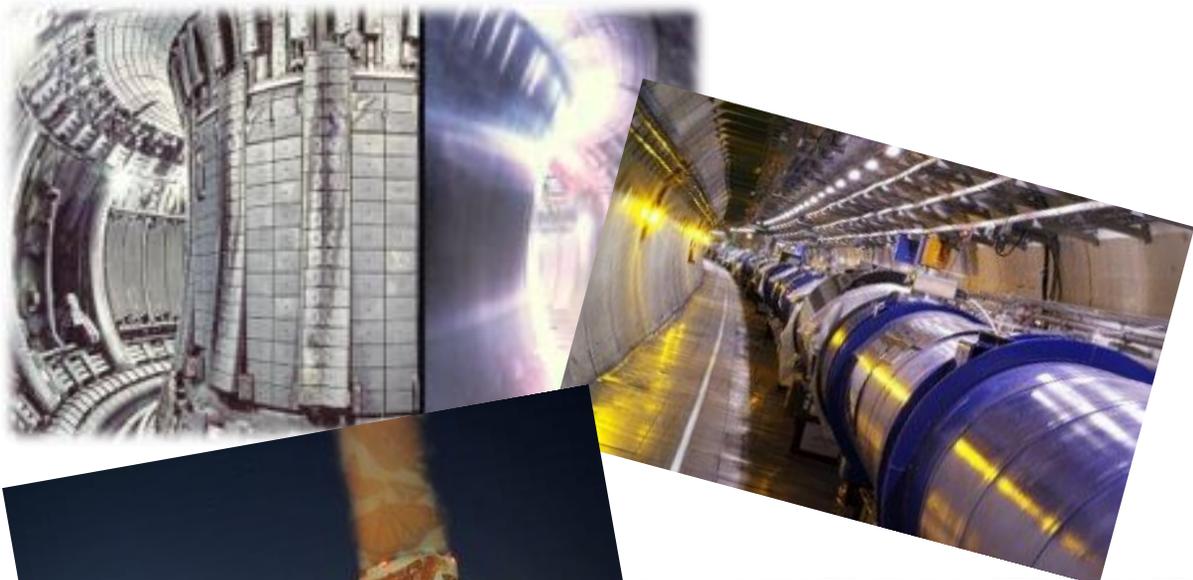
**POLITECNICO**  
MILANO 1863

SCHOOL OF INDUSTRIAL AND INFORMATION  
ENGINEERING

*Master of Science in*

**Nuclear Engineering**

# The fields of Nuclear Engineering



# Why should I choose Nuclear Engineering?

The Laurea Magistrale (equivalent to Master of Science) programme in Nuclear Engineering allows you to become an engineer capable of dealing with complex problems in the Nuclear Engineering sector, characterized by a variety of disciplines in close correlation. This programme will allow you to learn and acquire the skills to design, build and manage complex systems that use radiation or the energy produced by nuclear reactions. In particular, this category includes power plants for energy generation, installation for the treatment and conditioning of radioactive waste and structures for their storage, systems that use radiation for industrial and medical applications, laboratories for the development and the characterization of advanced materials.



# What can I do after graduation?

Once you have obtained your MSc in Nuclear Engineering, you will be able to operate in numerous sectors of high technology, within research institutions, industries, public control bodies, hospital centres, having acquired the ability to design and manage nuclear systems, sophisticated and innovative processes and services, and to design and conduct highly complex experiments, solving engineering problems that require an interdisciplinary approach, with specific skills in the applications of nuclear systems for energy production or radiation for non-energy purposes.

You can enter the working world not only in the nuclear sector (companies for the production of electronuclear energy, companies for the decommissioning of nuclear plants and radioactive waste disposal, companies for the design of generators for medical use, institutes and centres for nuclear fusion and physics of high energies), but also in different areas, as engineering and consultancy companies in the energy or medical industrial sector, hospital centres, companies for safety analysis and environmental impact, the European community as an official, research centres and universities. In an increasingly global market, employment opportunities in foreign companies and entities become more probable every year, as experienced by many of our graduates.

# What is being studied?

The Nuclear Engineering programme is characterized – in addition to the finalization of the basic preparation in mathematics and physics – by a strong background in nuclear disciplines thanks to courses concerning the physics of nuclear reactors, the nuclear power plants, the measurement of nuclear radiation and instrumentation, the safety of potentially high-risk systems and the study of nuclear materials. Elective courses allow you to deepen your preparation both in the energy field and in other areas.

The courses that are present in Nuclear Engineering programme are also characterized by a strong laboratory component. In addition to lecture and numerical exercises, you will be involved in computational, experimental and project works. There will also be educational visits to plants and / or research laboratories as well as innovative teaching methods as flipped / blended classroom, joint courses with the business world, research and institutions, and teaching of soft skills or with strong transversal contents.

## Are you still hesitant? You should know that...

- You will have access to internal research laboratories (radiochemistry, radiation protection, nuclear measurements and instrumentation, nuclear electronics, radiation metrology, health physics, materials science and nanotechnology) and external ones (TRIGA research reactor, SIET experimental thermohydraulic laboratories, hadrontherapy centre CNAO) where you can carry out hours of experimental teaching and your thesis work.
- The Nuclear Engineering programme in Politecnico di Milano is the most attended in Europe (over 60 new students every year).
- A strong internationalization characterizes the programme. You can carry out study periods abroad at prestigious and qualified international universities (such as MIT, UCLA, GeorgiaTech, the French grand écoles, the Cambridge, Oxford and Durham universities, EPFL, TUM, TU Delft , ...) or at research centers (CERN, JRC, KIT, JET, CEA, PSI, INL, EUROfusion)

For more information, visit our website

[www.ingnucleare.polimi.it](http://www.ingnucleare.polimi.it)

# Programme structure



## Bachelor of Science (Laurea)

Energy  
Engineering

Mat. and nanotech  
Engineering

Chemical  
Engineering

Biomedical  
Engineering

Physics  
Engineering

Mathematical  
Engineering

Aerospace  
Engineering

Other  
programmes



## Laurea magistrale (Master of Science) in Nuclear Eng.

1<sup>st</sup> Year

**Principles of Nuclear Engineering**  
20 ECTS to uniform and complete the education  
+  
40 ECTS of basic subjects related to Nuclear Engineering

2<sup>nd</sup> Year

**Elective courses among different tracks:**

- ⊛ Nuclear Plants
- ⊛ Nuclear Technologies
- ⊛ Nuclear Systems Physics

45 ECTS of subjects related to Nuclear Engineering

**Thesis work**

15 ECTS for the thesis work, to be performed in Italy or abroad



## First year courses

- ⊗ Principles of Mathematics, Physics and Nuclear Engineering
- ⊗ Radiation Detection and Measurement
- ⊗ Reliability, Safety and Risk Analysis / Solid State Physics / Industrial and Nuclear Electronics
- ⊗ Applied Radiochemistry / Physics of Nuclear Materials + Nuclear Techniques for the Analysis of Materials / Artificial Intelligence and Advanced Simulation for the Safety, Reliability and Maintenance of Energy System
- ⊗ Fission Reactor Physics I

## Second year courses

### Nuclear Plants

- ⊗ Nuclear Design and Technology
- ⊗ Fission Reactor Physics II / Transport of Radioactive Contaminants / Experimental Nuclear Reactor Kinetics
- ⊗ Contaminazione Interna + Radioprotezione Applicata / Artificial Intelligence and Advanced Simulation for the Safety, Reliability and Maintenance of Energy System / Reliability, Safety and Risk Analysis / Applied Radiochemistry

### Nuclear Technologies

- ⊗ Nuclear Design and Technology
- ⊗ Medical Applications of Radiation Fields / Contaminazione Interna + Radioprotezione Applicata
- ⊗ Applied Radiochemistry / Contaminazione Interna + Radioprotezione Applicata / Physics of Nuclear Materials + High Intensity Lasers for Nuclear and Industrial Applications / Fission Reactor Physics II + Transport of Radioactive Contaminants /

### Nuclear Systems Physics

- ⊗ Nuclear Design and Technology
- ⊗ Medical Applications of Radiation Fields / High Intensity Lasers for Nuclear and Industrial Applications
- ⊗ Plasma Physics / Physics of Nuclear Materials + Physics of Disorder Materials / Fission Reactor Physics II + Transport of Radioactive Contaminants / Statistical Physics

### Elective courses

- Subject field:
- ⊗ Industrial engineering
  - ⊗ Measurement and detection
  - ⊗ Computational methods
  - ⊗ Physics
  - ⊗ Multidisciplinary and Soft skills



**POLITECNICO**  
MILANO 1863