Specializing Master program

Nuclear Safeguards

A cross-divisional training path
for the global context

SENSSETT
Strengthening European
Nuclear Safety and Safeguards
Education training and tutoring

Co-funded by
the European Union

POLITECNICO
MILANO 1863

The Specializing Master is organized in collaboration with:

enen

European
Commission
Joint Research Centre

The organizers

European high level institutions for Nuclear Safeguards

The Specializing Master is organized by the **Department of Energy – Politecnico di Milano** in the framework **of the SENSSEtt project**, in collaboration with the European Joint Research Centre (EU JRC), academic institutions participating in the European Nuclear Education Network, ESARDA partners and international organizations.

Co-funded by the European Union

The Specializing Master is part of the SENSSEtt, Co-funded by the **European Union** in the frames of the Instrument for Nuclear Safety Cooperation.

POLITECNICO MILANO 1863

Politecnico di Milano (POLIMI) is a core academic institution hosting Specializing Master.
POLIMI is one of the leading scientific and technological universities in Europe. It trains engineers, architects and industrial designers. The Department of Energy of Politecnico di Milano brings together the scientific expertise necessary to deal and scrutinise subjects and energy-related technologies as a whole.

SENSSEtt Strengthening European Nuclear Safety and Safeguards Education training and tutoring

SENSSEtt is a European initiative committed to foster capacity building in Nuclear Safety and Safeguards Management.
Co-funded by the European Union under the EU-INSC Instrument and running from 2024 to 2029, this project unites leading European institutions – SKEMA Business School, Université Côte d'Azur, and Politecnico di Milano to drive academic excellence and expertise across borders.

The aim

The Specializing Master course on Nuclear Safeguards gives the opportunity to educate and develop the competences of employees in order to enhance the efficiency of their actions in the field of nuclear safeguards and support the continuous development of a professional, competent and motivated workforce.

This attitude contributes directly to both the national nuclear safety and the implementation of the countries' safeguards obligations under relevant agreements.

The context

The nuclear safeguards system is a key element of the international regime of the non-proliferation of nuclear weapons. Over decades it has evolved into a multifaceted set of legal and technical measures aimed at verifying the compliance of States with their non-proliferation commitments in the nuclear sector.

The need for training

Due to high demands on technical competence especially in the nuclear field, the ongoing availability of new information, development of new reactor types, new safety mechanisms and new assessment methodologies, there is a huge need for general, in depth and/or specialized training for the staff of NRAs.

The outcome

The Specializing Master will be organized as a cross-divisional training path, involving political science-forensics-nuclear scientific and technological areas, aimed to form key figures ready to be involved in the nuclear safeguards sector.

AWARDED TITLE

First level Specializing Master on Nuclear Safeguards' Degree

VALUE

60 ECTS

Students have to suitably complete the program of study and the ongoing examinations to obtain the title and its formal certification.

Program & training format

The blended format

The Specializing Master has a duration of around 15 months, and it is organized in a **blended format** with:

- 9 months of **online modules**;
- 5 weeks of **in-presence labs**;
- 3 months of **project work**.

Online modules

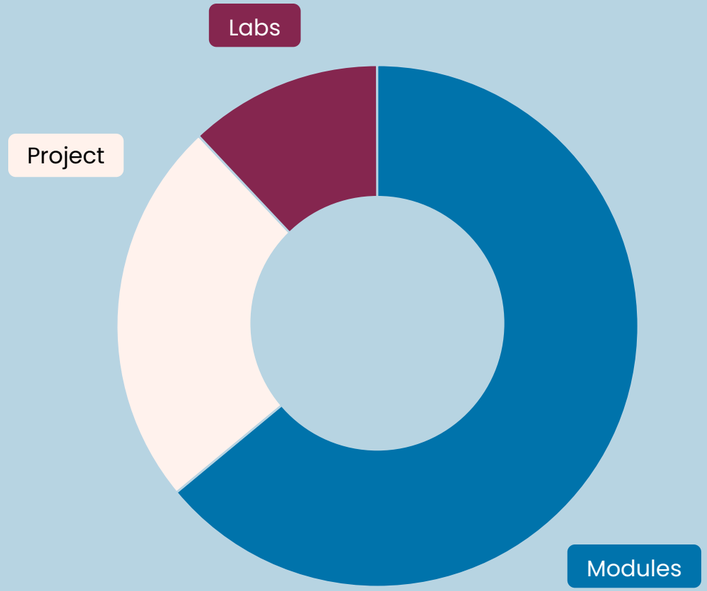
composed by digital contents (videos, quiz, additional materials), webinars, group activities

In-presence labs

held at Politecnico di Milano, JRC Labs in Italy and Europe and other European Labs which are part of the ENEN network

Project work

offers the opportunity to synthesise the knowledge acquired and critically apply it



Program & training format

Didactic modules 1/2

MODULE 01

Online

Introduction and basics

- Nuclear technologies
- Legal framework
- Soft Skills

MODULE 02

Online

History of non-proliferation and safeguards

- History and Policy of Nuclear dual-use
- EURATOM and IAEA Safeguards in the International Relations
- Historical making of Proliferation risks and Non-Proliferation policies

MODULE 03

Online

National and International legal frameworks

- Basics of Non Proliferation Treaty
- Comprehensive Safeguards Agreement
- State regulators, State's role, rights and responsibilities

MODULE 04

Online

Fuel cycle and non-proliferation

Elements of the fuel cycle: Mining, Conversion, Enrichment, Fuel fabrication, Reactors, Reprocessing, Waste Disposal, Aspects of Weaponisation, Physical Model/Pathway analysis

MODULE 05

Online

Methodology for implementation of safeguards

- Legal basis for nuclear material safeguards
- Tools to verify nuclear material accounts
- Political and legal options of inspectorates to apply sanctions in case of violations

MODULE 06

Online

Nuclear material accountancy and mathematical methods for nuclear safeguards

- Facility Attachments and Euratom safeguards regulation
- Nuclear material accountancy concepts
- Analytical methods and game theoretical concepts

LABs 1

Presence

Basic Labs

2 weeks of experimental tutoring activities and visits

Program & training format

Didactic modules 2/2

MODULE 07

Online

Destructive analysis

- Destructive Assay (DA) techniques
- Practical exercises with detectors currently approved for safeguards inspections

MODULE 08

Online

Non-destructive measurements

- Non-Destructive Assays (NDA) used for the measurement of nuclear material
- Introduction on the basic principles of NDA techniques

MODULE 09

Online

Verification and monitoring techniques incl. containment and surveillance

- Design Information Verification
- Process monitoring approaches
- Sealing technologies

MODULE 10

Online

Export control

- Main principles ruling nuclear trade control
- Analysis of international and regional legally and politically instruments
- General principles of international trade

MODULE 11

Online

Nuclear security

- Locations and use of nuclear and radiological materials
- Risks of misuse of nuclear and radiological materials
- Basics of physical protection, detection technologies and nuclear forensics analysis

LABs 2

Presence

Advanced Labs

3 weeks of training on the job and tutoring

MODULE 12

Online

Future challenges in safeguards

Novel technologies, approaches and methodologies

Online

Project work

Individual work or in pairs, resume and deepen the work done during the Advanced Labs

Fees and scholarships

This is a financially supported Master for EXTRA EU students, with special regards to INSC (Instrument for Nuclear Safety Cooperation) Countries originated students.

FOR STUDENTS FROM INSC COUNTRIES

scholarships fully funded

by European Commission

FOR THE OTHER STUDENTS

partial scholarships

will be provided by POLIMI

14500 €
enrolment fee

+

500 €
tax fee

Timing

July 2025 — Application opening and selection

October 2025 — End of the selection phase

October 2025 — Communication of admission

FROM **November 2025** TO **March 2027** — Specializing Master didactic activities

Eligibility and admission

TITLE REQUIRED

Bachelor degree

in: Science, Technology, Engineering and Math, Law, Economics or Political Science

CONSIDERED AS AN ASSET

Nuclear specialized Bachelor

or nuclear topics at the Bachelor level

CONSIDERED AS AN ASSET

Working in nuclear field

RECOMMENDED

English knowledge certification

or self-certification (B2 level)

Selection methods

All the candidates will be evaluated on:

- CV in European Format
- Bachelor or Master of Science Degree
- Motivation Letter
- Support Letter from Government, Institution, Foundation, Professor

Location

Nov 2025 - Oct 2027 ONLINE DIDACTIC MODULES	Online
June 2026 BASIC LABS	Italy – Politecnico di Milano
Nov 2026 - Feb 2027 ADVANCED LABS	Each Advanced Lab will be organized in accordance to topic requests and institution availability
March 2027 FINAL EXAM AND GRADUATION	Italy – Politecnico di Milano

Contacts

E-MAIL

master-nuclearsafeguards@polimi.it

WEBSITE

https://www.nuclearsafeguards.polimi.it