

Teaching Institution: Politecnico di Torino, Facoltà di Ingegneria, Corso di laurea in Energetica

Research Institution: Politecnico di Torino, Dipartimento di Energetica

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Educational Offer for Academic Year 2007-2008

DEGREE COURSES RELATED TO NUCLEAR ENGINEERING

http://didattica.polito.it/pls/portal30/sviluppo.offerta_formativa.corsi?p_sdu_cds=32:834&p_lang=EN

BACHELOR DEGREE IN ENERGY ENGINEERING

The aim of this degree (Laurea) is to give the students a good basic education that lets them manage already existing technologies and adapt to new ones. Knowledge of mathematics and physics are very important apart from everything concerning energy: processing, technologies and systems. Interdisciplinary knowledge is central for the energy engineer, since he must know mechanical and electrical systems, and be able to design and manage them. **General Curriculum** enhances the basic knowledge, in order to manage advanced issues on energetics. The topics complete the basic ones, like mathematics and physics, with knowledge of thermodynamics, computational methods for energetics, etc, useful for the Master's Degree (**Laurea magistrale**). There are also application oriented topics, important for the work-market. **Professional Curriculum** gives the engineer the knowledge to handle industrial and professional applications. It has a larger number of application oriented topics on rational use of energy, thermophysics and air control, and also **some compulsory introduction courses on nuclear engineering**.

MASTER OF SCIENCE DEGREE IN ENERGY AND NUCLEAR ENGINEERING

The Master of Science in Energy and Nuclear Engineering (Laurea Magistrale) enhances basic knowledge in the energy and nuclear fields. The aim is to create an engineer able to design, solve complex problems that requires a multidisciplinary approach, and which has the necessary competence to confront problems of scientific research in traditional energetics and development of nuclear sources. It is possible to go abroad during the period of study and there is the opportunity to obtain a double degree in partnership with some European universities as well. The Master of Science Degree includes two programs: Technologies for Energetics and Technologies for Nuclear Applications. **Technologies for Energetics** gives the student the skills to design and manage thermal, mechanical and electrical energy, using renewable and fossil sources, in order to develop innovative solutions. **Technologies for Nuclear Applications** gives the student the skills to design and manage systems that produce nuclear energy; he/she is aware of the environmental problems that depend on nuclear technology. Furthermore, anyone who has a Master's Degree in Nuclear Engineering can obtain an

European Master (EMSNE given by the ENEN Association) studying one semester abroad.

General Description of Master of Science Degree Course

At the time of the Bologna Convention implementation in Italy, the attempt was made to **preserve the Nuclear Engineering culture embedded in a 40 years old tradition**. The present Master of Science Degree Course in **Energy and Nuclear Engineering** inherit many characteristics of the previous pre-Bologna Convention 5 year Degree Course in Nuclear Engineering, enlarging the perspective to the more general field of Energy, as it is necessary for a Country that, though importing a consistent share of electricity produced by electro-nuclear plant in neighbouring Countries, has not abandoned its nuclear phase-out policy. **Separate curricula dealing with “Technologies for Nuclear Applications” and “Technologies for Energetics” are proposed to students in this purpose.**

Notwithstanding the adverse national conditions, **Nuclear Engineering studies in Torino continue to attract a few committed students** who found employment and great appreciation for their **broad educational background** in Nuclear Industry and Research Centres worldwide and in Italy. The main characteristic of such studies in Torino has always been **a rigorous preparation, conceived over a 5 year perspective and 300 ECTS, in all the matters needed to deeply understand nuclear reactor technology**, including strong bases in mathematics, physics and all the classical engineering subjects, together with a thorough specialization in the nuclear field. Matters like Reactor Physics, Radiation Protection, Nuclear power plant technology, are accompanied by more deeply studies in Nuclear Thermal-hydraulics, Reactor Plants, Safety and Reliability of Nuclear Reactors, Reactor Control and Operation, Nuclear fusion engineering. **This blend of different matters is aimed at providing our students with a superior flexibility**, putting them in a very good position for undertaking specialized tasks in their professional and/or research careers **with a clear perspective of the whole reactor plant context**. This view of the Nuclear Engineer, as a figure encompassing expertise in the many fields in which knowledge is required to properly serve the development of nuclear technology, has been **quite an atout in the national and international market of nuclear engineers** and is now proposed in the scene of ENEN as **a study scheme that goes well beyond the minimum requirement of 60 ECTS credits in nuclear matters**, characterized by a careful 5 year preparation to become Nuclear Engineers.

PhD COURSE

Dottorato di Ricerca in Energetica (Research Doctorate in Energetics, 3 yrs, 180 ECTS)

<http://didattica.polito.it/pls/portal30/sviluppo.scudo.dott?li=EN&cod=301&sez=Educational%20Goals>

Research Doctorate Courses started in Italy in the early '80s. **From the very beginning, a Research Doctorate in “Energetics” was established in Torino**. In total 22 cycles of Doctorate were completed. The goal of the course is to guide the students in the development of advanced scientific research in the field of energy systems, with special regard to the sectors of technical physics, **nuclear** and fluid machine **engineering**.

ENEN EXCHANGE COURSES

In the frame of the Master of science degree in **Energy and Nuclear Engineering** the following **Exchange Courses offered to ENEN students**, each worth of 5 ECTS credits, are proposed, being: **Nuclear Reactor Physics, Fusion Reactor Engineering, Radiation Protection, Nuclear Power Plant Safety**, and starting from this year also **Computational thermal fluid dynamics**.

Subjects for **master of science theses** are also proposed to foreign students.

COURSE STATISTICS

As previously mentioned, due to the situation of nuclear energy in Italy, the Master of Science Degree Courses presently attract a relatively small number of students, although it is still too early to provide precise statistics, as a steady-state regime has been not yet reached after the reform. In the academic year 2007-2008 there are **12 students enrolled in the Master of science degree in Energy and Nuclear Engineering.**

The **Research Doctorate in Energetics** has generally at least six fellowships each year, but a double number of students can be enrolled. On average **3 of them choose Nuclear Engineering topics.** Often they have stages abroad. The Doctorate is also open to foreign students.