Teaching Institution: Politecnico di Milano, Facoltà di Ingegneria dei Processi Industriali
Research Institution: Politecnico di Milano, Dipartimento di Ingegneria Nucleare
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Educational Offer for Academic year 2007-2008

DEGREE COURSES IN NUCLEAR ENGINEERING
> www.cesnef.polimi.it and www.ingpin.polimi.it

Presently activated Courses

- **Laurea Specialistica in Ingegneria Nucleare (MSc in Nuclear Engineering, 2 yrs)**
  President: Prof. Leone CORRADI DELL'ACQUA, Tel. +39-02-23996343, e-mail: leone.corradi@polimi.it

General description of Courses

Nuclear Engineering was introduced as an institutional and independent academic curriculum in year 1955/1956 and the Politecnico di Milano was the first Italian University to offer it. First nuclear engineering students graduated in 1958. Since then, their number grew to about 1500. At the Politecnico di Milano, the curriculum is divided in two branches, both dealing with the study and the use of radiation:

- The **Nuclear System** curriculum, focusing on engineering and research problems connected with nuclear plants for energy production;
- The **Radiation** curriculum, dealing with the use of radiation for purposes other than energy production.

Students from Politecnico di Milano, within first level studies in Energy Engineering, Physical Engineering and Electrical Engineering, may choose curricula containing a number of introductory nuclear engineering courses, which provide direct admission to the second level curriculum in Nuclear Engineering. Students with other engineering degrees, both Italian and from abroad, may apply and be admitted with some additional requirements. Both the mentioned curricula fit into a unified methodological framework, which pays great attention both to physics and mathematics - as bases of engineering applications - and to specific aspects such as radiation - matter interaction, fluid dynamics, heat and radiation transfer and problems related to safety and structural reliability. In the last part of the two year period, students are asked to work out a meaningful design activity, focusing on a specific subject, which must be developed so as to witness their capabilities in mastering the problem and of solving independently non trivial aspects of it. Attention is also paid at their communication skill. Students may exploit, for courses or research period, several contacts and

mutual agreements with foreign academic institution.
The curriculum in Nuclear Engineering is characterized by strong mutual interaction between different fields; as such it opens job opportunities in several sectors in which advanced technology is involved, both in the national and international context. Among them, academic, public administration and industrial research boards, industries, medical hospitals and so on. Examples of specific activities are:

- Design, construction and control of nuclear power plants, in Europe and outside;
- Innovative power plant design;
- Decommissioning of nuclear plants and radioactive waste disposal;
- Application of radiation to medical (both for diagnostics and therapeurics), environmental, chemical and industrial purposes;
- Radiation protection and health physics;
- Design, construction and control of instrumentation for modern research in physics, including nuclear physics and physics of matter;
- Analysis and mathematical modeling for safety, design and control of plants with high risk potentials;
- Development and characterization of innovative materials for advanced technology;
- Special and innovative instrumentation for nuclear radiation.

The Master Degree (MSc) graduate in Nuclear Engineering may operate in public and private research and production centers involved in highly developed technological fields. In fact, he has acquired the capability of designing and managing sophisticated systems and plants and of performing complex experiments, by mastering problems requiring that different fields of knowledge be considered together. Specific capabilities refer to applications in nuclear power plants or to the use of radiation for purposes other than energy production. The course requires a full time attendance and involves both classroom and laboratory activity (experimental and numerical). As specified by didactic regulations, 120 credits are required to obtain the degree.

PhD Level

Dottorato di Ricerca in Scienza e Tecnologia delle Radiazioni (Research Doctorate in Radiation Science and Tachnology, 3 yrs)

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The Doctoral Program introduces the student to the radiation science and technology field applied to radio-protection, nuclear plant design and instrumentation, physics of condensed matter and new material investigation, industrial and medical diagnostic, medical therapy, chemical process catalysis. The approach involves many disciplines and aims at
i) allowing the doctoral student to gain the state-of-the-art in his/her field of investigation in order to effectively conduct the research,
ii) developing models, instrumentation, or experiences capable of increasing the scientific and technological knowledge on radiations and the systems related,
iii) creating and verifying new technological solutions for specific industrial requirements and constraints.

Course Statistics

The Master Degree Course in Nuclear Engineering presently attracts about 25-30 students per year, which is believed to be a steady-state

regime figure. Students enrolling in Nuclear Engineering mainly have a Bachelor Degree in Energy Engineering, Physics Engineering and Electrical Engineering, but students with a different background are also considered and some of them are attending courses.
The "Dottorato di Ricerca" has generally at least three fellowship each year, but a double number of students can be enrolled. Generally, external grants are available to these students and an average of six or more students per year have the possibility to attend courses and perform a research work in the frame of the Doctorate. Many of them decide to have stages abroad and co-tutorship with foreign Universities is allowed. The Doctorate is also open to foreign students, sometimes provided with specific grants.