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Educational Offer for Academic year 2007-2008

DEGREE COURSES IN NUCLEAR ENGINEERING

www.web.ing.unipi.it/didattica/nucleare/descrizione_lt

www.web.ing.unipi.it/didattica/didattica/lauree_specialistiche

Presently activated Courses

- **Laurea in Ingegneria della Sicurezza Industriale e Nucleare (BSc in Engineering of Industrial and Nuclear Safety, 3 yrs)**
President: Prof. Marino MAZZINI, Tel. +39-050-836658, e-mail: m.mazzini@ing.unipi.it
- **Laurea Specialistica in Ingegneria Nucleare e della Sicurezza Industriale (MSc in Nuclear and Industrial Safety Engineering, 2 yrs)**
President: Prof. Giuseppe FORASASSI, Tel. +39-050-836615, e-mail: g.forasassi@ing.unipi.it

General description of Courses

At the time of the Bologna Convention implementation in Italy, the attempt was made to **completely preserve the Nuclear Engineering culture embedded in a 40 years old tradition, adding the broader perspective of Industrial Safety**, which takes profit of the particular accent that Nuclear Engineering studies in Pisa have always assigned to plant safety. This allows for transferring to the conventional industrial field the know-how that is now required to assess and minimize the risk from any industrial installation.

The present Degree Courses in Nuclear and Industrial Safety Engineering inherit many characteristics of the previous pre-Bologna Convention 5 year Degree Course, enlarging the perspective to the more general field of Industrial Safety, 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 “Nuclear Engineering” and “Industrial Processes” are proposed to students in this purpose.**

Notwithstanding the adverse national conditions, **Nuclear Engineering studies in Pisa have always attracted a niche of very 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 Nuclear Engineering studies in Pisa has always been **a rigorous preparation, conceived over a 5 year perspective, 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 Detection and

Measurement and Radioprotection are accompanied by sound studies in Structural Mechanics for Nuclear Plants, Nuclear Thermal-hydraulics, Reactor Plants, Safety and Reliability of Nuclear Reactors, Reactor Control and Operation, Quality Assurance. **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.

Starting with the Academic year 2005-2006, an effort was made to propose to foreign students, willing to receive the ENEN certification, **EMSNE Exchange Courses taught in English** in two weeks (**four 6 ECTS credit modules**). Two of these courses were already held in the summer of 2006 with a relatively small attendance (3 students), but the offer is still open and is being enriched with further proposals (see www2.ing.unipi.it/~d8155/Pisa-Courses-Announcement.htm). Subjects for master of science theses are also proposed to foreign students (see www2.ing.unipi.it/~d8155/Pisa-MScTheses-Announcement.htm).

PhD Level

Dottorato di Ricerca in Sicurezza Nucleare ed Industriale (Research Doctorate in Nuclear and Industrial Safety, 3 yrs)

> more <http://docenti.ing.unipi.it/dimnp/dottorsicur/index.htm>

Research Doctorate Courses started in Italy in the early '80s. **From the very beginning, a Research Doctorate in “Nuclear Engineering (Safety of Plants)” was established in Pisa**, allowing motivated Nuclear Engineers to enroll into quite stimulating research activities in all the matters also addressed by the Degree in Nuclear Engineering. In total 14 cycles of Doctorate were completed, before the **Research Doctorate in Sicurezza Nucleare e Industriale (Nuclear and Industrial Safety)** was established, in similarity with the process of broadening perspectives experienced by the Degree Courses after the implementation of the Bologna Convention. In strict resemblance with the Degree Courses, **two different curricula** are presently available in the Research Doctorate, addressing respectively nuclear technology and the more general field of safety in the industrial field.

ENEN Exchange Courses

In the frame of the Laurea Specialistica in Ingegneria Nucleare e della Sicurezza Industriale the following **Exchange Courses offered to ENEN students**, each worth of 6 ECTS credits, are proposed, being: “Introduction to Nuclear Engineering”, “Structural Mechanics–Nuclear”, “Single and Two-Phase Thermal-Hydraulics”, “Numerical Methods for Nuclear Reactors”.

Course Statistics

As previously mentioned, due to the situation of nuclear energy in Italy, the Degree Courses presently attract a relatively small niche of

students. At the first level (the 3 year “Laurea”, the average number of students enrolling at the first year in the two curricula has been in the range of 15 after the implementation of the Bologna Convention. At the second level (the 2 year “Laurea Specialistica”), it is still too early to provide precise statistics, as a steady-state regime has been not yet reached after the reform. An increasing interest for nuclear matters is noted in recent years also from students enrolled in other Degrees (e.g., Energy Engineering) who attend specific nuclear courses and ask for thesis work in the nuclear field in increasing number.

The “Dottorato di Ricerca” has generally at least three bourses 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.