

European Master of Science in Nuclear Engineering

**Frans Moons¹, Joseph Safieh², Michel Giot³, Borut Mavko⁴, Bal Raj Sehgal⁵,
Anselm Schäfer⁶, Georges Van Goethem⁷, William D'haeseleer⁸**

- 1) Studiecentrum voor Kernenergie•Centre d'étude de l'Energie Nucléaire, B-Mol
- 2) Commissariat à l'Energie Atomique, Institut National des Sciences et Techniques Nucléaires, F-Saclay
- 3) Université Catholique de Louvain, B-Louvain-la-Neuve
- 4) Jozef Stefan Institut, SI-Ljubljana
- 5) Royal Institute of Technology, S-Stockholm
- 6) Technische Universität München, D-München
- 7) European Commission, B-Brussels
- 8) Katholieke Universiteit Leuven, B-Leuven

E-mail address of main author: frans.moons@sckcen.be

The need to preserve, enhance or strengthen nuclear knowledge is worldwide recognised since a couple of years. Among others, "networking to maintain nuclear competence through education and training", was recommended in 2001 by an expert panel to the European Commission.(EUR 19150 EN).

It appears that within the European university education and training framework, nuclear engineering is presently still sufficiently covered, although somewhat fragmented. However it has been observed that several areas are at risk in the very near future including safety relevant fields such as reactor physics and nuclear thermal-hydraulics. Furthermore, in some countries deficiencies have been identified in areas such as the back-end of the nuclear fuel cycle, waste management and decommissioning.

To overcome these risks and deficiencies, it is of very high importance that European countries work more closely together. Harmonisation and improvement of the nuclear education and training have to take place at an international level in order to maintain the knowledge properly and to transfer it throughout Europe for the safe and economic design, operation and dismantling of present and future nuclear systems. To take up the challenges of offering top quality, new, attractive and relevant curricula, higher education institutions should cooperate with industry, regulatory bodies and research centres, and more appropriate funding from public and private sources. In addition, European nuclear education and training should benefit from links with international organisations like IAEA, OECD-NEA and others, and should include world-wide cooperation with academic institutions and research centres.

The first and central issue is to establish a European Master of Science in Nuclear Engineering. The concept envisaged is compatible with the projected harmonised European architecture for higher education defining Bachelors and Masters degrees. The

basic goal is to guarantee a high quality nuclear education in Europe by means of stimulating student and instructor exchange, through mutual checks of the quality of the programmes offered, by close collaboration with renowned nuclear-research groups at universities and laboratories. The concept for a nuclear master programme consists of a solid basket of recommended basic nuclear science and engineering courses, but also contains advanced courses as well as practical training. Some of the advanced courses also serve as part of the curricula for doctoral programmes.

A second important issue identified is Continued Professional Development. The design of corresponding training courses has to respond to the needs of industry and regulatory bodies, and a specific organisation has to be set up to manage the quality assessment and accreditation of the Continued Professional Development programmes.

In order to achieve the important objectives and practical goals described above, the ENEN Association, a non-profit association under French law, was formed. This international association can be considered as a step towards the creation of a virtual European Nuclear University symbolising the active collaboration between various national institutions pursuing nuclear education.

Based on the concepts and strategy explained above, and with the full co-operation of the participating institutions, it may be stated that the intellectual erosion in the nuclear field can be reversed, and that high quality European education in nuclear sciences and technology can be guaranteed.