

EuroTraining

- Supporting University Programmes in Nanoelectronics and Nanosystems

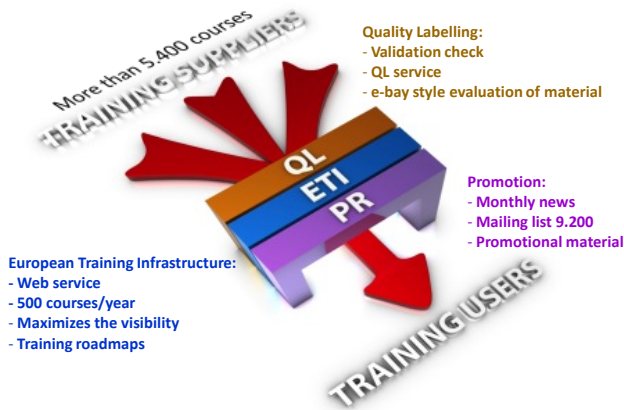
EuroTraining Services

This paper describes how the EuroTraining project supports a timely introduction of new nanoelectronics and nanosystems university programmes in Europe. The provisions include *training courses*, *training material* and *training roadmaps*.

Training courses

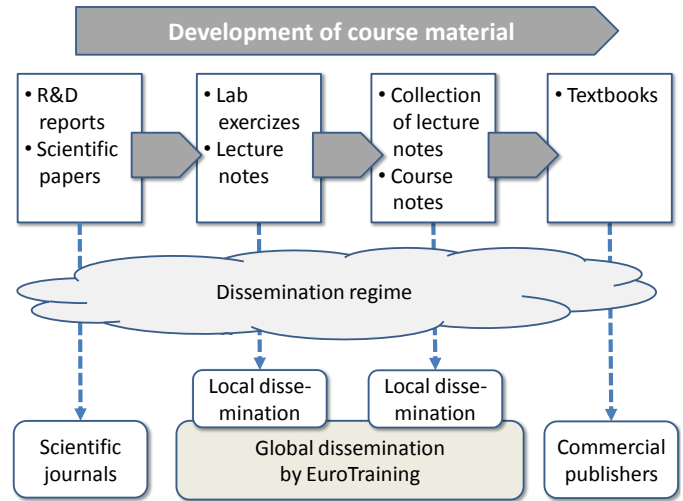
EuroTraining offers access to a comprehensive range of advanced training courses, structured in groups of ECTS accredited courses, Quality Labelled courses and other courses.

Annually EuroTraining offers more than 500 courses. Nearly half of these courses are either ECTS courses or Quality Labelled courses. Since the start in 1995 of the preceding EuroTraining project 5.400 courses have entered into the web service and more than 1.2 mill. training users have accessed the service in order to find the right training. The general rationale of the project's course brokerage activity is shown in the figure below:



Training material

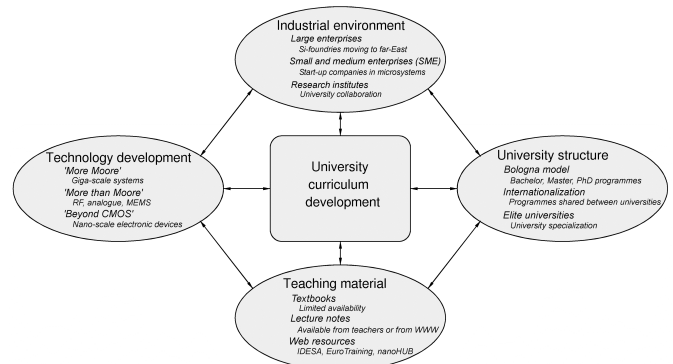
The development of training material is normally a process going from writing R&D reports and scientific papers which are converted to lab exercises and lecture notes which later become an entire course. Over the years more mature course material may be turned into textbooks published by international publishers. This value chain for the development of course material is shown in figure 2.



While scientific papers and textbooks are disseminated globally, the course material developed is only disseminated locally. This means that other users (universities) may have to wait for textbooks to be published some years downstream of the actual course material. By making the course material available through EuroTraining it becomes available globally and consequently new nanoelectronics and nanosystems courses become available much quicker. Thereby, this platform fills a gap between local dissemination (at one university to a particular group of students) and global dissemination by means of commercial publishers.

Training roadmaps

EuroTraining has developed training roadmaps describing the requirements with respect to developing new nanoelectronics and nanosystems curricula. Major influencers in the development of new curricula have been defined and discussed and a model for the development of new curricula has been presented:



As part of the road mapping activity two major reports have been provided:

- D2.1-n, Description of nanoelectronics courses and syllabuses from selected universities
- D2.1-mst, Description of micro/nanosystems courses and syllabuses from selected universities.

These reports are available on www.EuroTraining.net.

In addition to providing descriptions of selected courses and programmes, the reports outline development models for university programmes and provide a number of recommendations, both for universities in developing new programmes and for student in selecting programmes and courses.

Main recommendations for universities are:

- promote PhDs in new nanoelectronics and nanosystems areas. Phd programmes are often the starting point for developing new university programmes ranging all the way from bachelor, via master to PhD;
- promote summer schools in nanoelectronics and nanosystems. Summer schools are a good way of introducing new topics, especially in PhD programmes;
- promote cross utilization of courses among Physics/Electrical Engineering/Computer Science. Providing courses which can be followed by students both from e.g. physics and electrical engineering or computer science and electrical engineering ensures broad educational programmes resulting in flexible and versatile engineers;
- promote cross utilization of lecture notes and labs. Lecture notes and lab exercises can be made available to others and can be obtained from www.EuroTraining.net;
- promote text book creation. Especially for bachelor programmes textbooks are needed, rather than loosely structured lecture notes;
- promote multiple degree programmes. Programmes shared between different universities can be an efficient way of utilizing top competences from different places;
- encourage change of track between Physics/Electrical Engineering/Computer Science when going from bachelor programme to master programme. This ensures flexible and versatile engineers.

Main recommendations for prospective students are:

- use the Internet when searching for the programme, which is most suitable for you;
- start the search at a directory or catalogue site to get a general impression about the available programmes: you can use the www.eurotraining.net site, but you can find more sites, which you would like, and as time passes the number of useful websites is increasing;
- check the general quality of the universities which came into your scope, you can use some reliable sites that make ranking for you;
- check the available topics at the selected universities, whether your favourable topic is taught there or not, take special attention on application oriented

programmes: the knowledge you can obtain from such a programme would certainly help you to find a good job or to join a successful enterprise;

- check whether the courses are available in your preferred language, which would be very useful for you if it were different from your mother tongue;
- try to find out if scholarship opportunities are offered to be applied for, and if the everyday living expenses meets your possibilities.

EuroTraining makes a great effort in disseminating the recommendations through presentation at conferences, workshops and in journals dealing with university education. A list of recent presentations resulting from the EuroTraining programme is given below.

List of conference/journal publications:

Erik Bruun and Ivan Ring Nielsen, "Presentation of a Nanoelectronics Curricula Study," Proc. 7th European Workshop on Microelectronics Education, pp. 74-75, Budapest, Hungary, May 27-30, 2008. <http://www.eda-publishing.org/ewme2008/htmls/pdfs/A301.pdf>

Zsolt Illyefalvi-Vitéz and Hervé Fanet, "EuroTraining develops the Nanoelectronics Training Roadmap," Proc. 7th European Workshop on Microelectronics Education, pp. 76-77, Budapest, Hungary, May 27-30, 2008. <http://www.eda-publishing.org/ewme2008/htmls/pdfs/A302.pdf>

Zsolt Illyefalvi-Vitéz and Hervé Fanet, "The Nanoelectronics Training Roadmap of EuroTraining," Proc. 20th EAEIE Annual Conference (European Association for Innovation in Education for Electrical and Information Engineering), pp. 1-6, Valencia, Spain, May 22-24, 2009.

Erik Bruun and Ivan Ring Nielsen, "University Curricula in Nanoelectronics," Proc. 20th EAEIE Annual Conference (European Association for Innovation in Education for Electrical and Information Engineering), pp. 1-6, Valencia, Spain, May 22-24, 2009.

Ivan Ring Nielsen and Erik Bruun, "EuroTraining - Supporting University Programmes in Nanoelectronics," Proc. 8th European Workshop on Microelectronics Education, pp. 86-88, Darmstadt, Germany, May 10-12, 2010. http://www.mes.tu-darmstadt.de/media/mikroelektronische_systeme/pdf_3/ewme2010/proceedings/sessioniii/nielsen_paper.pdf

Erik Bruun and Ivan Ring Nielsen, "A model for the development of university curricula in nanoelectronics," European Journal of Engineering Education, 2010 (to appear).