



Aalto University
School of Science

Kansalliset ja kansainväliset tuulet ydinenergia-alan tohtorikoulutuksessa

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Teknillisen fysiikan laitos

Aalto-yliopisto



- Ydintekniikan ja radiokemian tohtoriohjelma (Doctoral Programme for Nuclear Engineering and Radiochemistry)
- Suomen Akatemian rahoittama ohjelma 2012 – 2015
 - 7 tutkijanpaikkaa à 4 vuotta (~70%), teollisuuden lisärahoitus (~30%)
 - merkittävä toimintarahoitus yhteisiin seminaareihin ja tutkijoiden matkakuluihin
- Yhteensä 14 tohtoria ohjelman piiristä 12.11.2015 mennessä, toinen kokonaan vielä tulossa
- Pilottiprojekti: v. 2015 tarjottiin 4:lle yliopistojen ulkopuolella työskentelevälle tutkijalle mahdollisuus väitöskirjan viimeistelyyn (3 – 5 kk) yliopistossa

YES

- Ydinenergia-alan kansallinen tutkimusstrategia
- Suositus nro 5 / 7:
 - *”Ydinenergia-alalle on tutkijakoulutuksen laadun ja määrän varmistamiseksi perustettava laaja ja kattava kansallinen tohtoriohjelmaverkosto”*
 - *”Yliopistojen, tutkimuslaitosten, viranomaisten sekä teollisuuden yhteistyö koulutuksessa ja väitöskirjaan tähtäävän tutkimuksen ohjauksessa sekä asianmukaisen tutkijavaihtojärjestelmän järjestämisessä ovat avainasemassa”*
 - *”Kansallisen tason koordinoinnin on oltava tehokasta ja näkyvää”*
- Rahoitus yliopistojen vastuulla
 - Mitä tämä tarkoittaa?

NST

- Doctoral Education Network in Nuclear Science and Technology
- Response to YES: let's build a comprehensive network!
- The network will provide education for doctoral students working in nuclear engineering, nuclear safety, thermal hydraulics, fusion technology, radiochemistry, materials science for nuclear applications, nuclear waste management, radiation safety, and related fields
- Primus motor: Aalto University

NST continued (# profs / ~pwy)

- Aalto University (21 / 60): physics, materials, systems, engineering, organization, ICT, grid, fire safety, ...
- LUT (2 / 30): nuclear engineering, CFD
- UH (4 / 25): radiochemistry, physics
- TUT (4 / 15): chemistry, physics, automation, reliability
- JyU (5 / 10): physics, social sciences
- UEF (1 / 5): radiation risks
- OU (2 / 2): industrial engineering, environmental engineering
- ÅA (1 / 1): physics

NST objectives

- multi-disciplinary environment for the education of doctoral students
- increase of flow of ideas and expertise between the member groups
- an avenue for the interaction of the member groups with leading groups from outside Finland through networking events
- active participation of member groups in international networks with NST, offering greater collaboration and development opportunities to doctoral students. European Nuclear Education Network ENEN (www.enen-assoc.org) – Filip Tuomisto, Juhani Hyvärinen (LUT)
 - The European Fusion Education Network FUSENET (www.fusenet.eu) – Mathias Groth
 - The European Network on Nuclear and Radiochemistry Education and Training NRC NETWORK (www.cinch-project.eu) – Jukka Lehto (UH)
- fundraising for doctoral student salaries!

NST activities

- Fostering stronger collaborations between members of the network by supporting medium to long-term exchange visits for students. These focus on a clear scientific goal that can be achieved during the period of exchange.
- The members have a long and active history in organizing events within Finland and the network will be a critical mechanism in maintaining and expanding this activity. We will support network events that bring together global experts and national leaders in nuclear science and technology on a focused set of topics. These events will provide ample opportunities for students to interact with the experts in their field and also with each other.
- Supporting participation in international meetings of particular importance to students of member groups.

ENEN Association

- The European Nuclear Education Network is a non-profit international organization established on 22 September 2003 under the French Law of 1901
- Its mission is the preservation and further development of expertise in the nuclear fields by higher education and training through:
 - promotion of networking for education and training in Europe
 - favoring borderless mobility of students and teachers
 - providing attractiveness for young and motivated students
 - leading relevant EU Projects for E&T and R&D among which EFTS
 - qualifying itself as a reference institution for the cross-cutting issue of E&T in the nuclear fields: a “bridge” academia ↔ stakeholders

The ENEN association cont'd

- At the moment: 66 members (49 Universities or University clusters, 8 research institutions, 5 industrial bodies, 2 International Agencies or Societies)
- MoUs with IAEA, ENS, JRC, FUSENET, NUGENIA
- Serves as IAEA reference for ANENT, LANENT, AFRANES
- Management structure:
 - President: Prof. Walter Ambrosini, UoP
 - Vice President: Prof. Javier Dies, UPC
 - Secretary General: Pedro Dieguez Porras (INSTN, Tecnatom)
 - Board of Governors: 9 members incl. President and VP
 - HQ in Saclay, France
 - <http://www.enen-assoc.org>

ENEN activities: EMSNE certification

- European Master of Science in Nuclear Engineering
- student applies (ENEN membership process involves QA)
- full degree (from ENEN member) min. 300 ECTS, out of which 60 ECTS in nuclear sciences and technologies, preferably engineering
- topics: reactor engineering, reactor physics, nuclear thermal hydraulics, safety and reliability of nuclear facilities, reactor engineering materials, radiology and radiation protection, nuclear fuel cycle and applied radiochemistry
- 20 ECTS of nuclear courses at another ENEN member located in another country than the host
- MSc thesis on a nuclear engineering topic

ENEN activities: PhD event & prize

- Idea: promote the work of the young scientists and researchers who start their career when finishing their PhD. Takes place on a yearly basis in the framework of an international conference in the nuclear field
- The ENEN PhD Event is a 1-2 days session where 10-12 PhD Finalists, nominated by ENEN Members and selected by the a jury, present their research in an competitive but friendly environment
- The ENEN PhD Prize is awarded to the best three presentations: support of up to 1000 eur to attend to an international conference

ENEN activities: recent E&T projects

- NUSHARE (nuclear safety culture, post-Fukushima)
- PETRUS II & III (geological disposal)
- TRANSNUSAFE (nuclear safety culture)
- ENETRAP II (radiation protection)
- ENEN III (coordination of training schemes across Europe)

- EUJEP 1 & 2 (EU – Japan cooperation)
- ENEN RU I & II (EU – Russia cooperation)

Looking forward

- ANNETTE (2016 – 2020), Advanced Networking for Nuclear Education and Training and Transfer of Expertise (H2020)
 - 3 M€ CSA, with 27 partners
- Coordination (instead of multiplication) of efforts and efficient cooperation in education across all nuclear fields in Europe
 - Investigation of the possibilities and implications is a WP in the ANNETTE project
 - policy supported by the EC
- Aalto University: main role in organizing an international summer school combining PhD and CPD training measures in 2017 or 2018 – coordination with NST activities!

Yhteenveto

- Tohtorinkoulutus etenee ja kehittyy
- Kansallinen taso: verkoston rakentaminen aloitettu
- Kansainvälinen taso: yhteyksiä tiivistetään, yhteistyötä myös
- Avoin kysymys: tohtorikoulutettavien rahoitus
 - Hyviä ideoita (ja rahaa) otetaan vastaan!



Thank you for
your attention!