CEA – INSTN :

National Institute of Nuclear Science and Technology

More than 50 years’ experience in E & T

Dr. Joseph Safieh

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Brief history and scope

- INSTN founded in 1956
  - Part of CEA
  - High level education, agreement between ministries in charge of universities and industry
  - Devoted to educational programs specialized in the nuclear field, for research as well as industrial purposes
    - Diplomas
    - Professional training

- Evolution
  - Initial objectives remains the same but french nuclear sector has changed
    - CEA is now a research institution coupled with technological and industrial needs: defense and security, non-GHG energy (nuclear, solar, FC, …), information and health (micro-electronics, biotechs, imaging, …), fundamental research
    - Industrial operators have become world-sized companies: AREVA, EDF
    - Safety and radioprotection authorities evolved as independant entities
  - INSTN now in charge of:
    - High level educational programs in partnership with universities and engineering schools
    - Professional training for CEA as well as nuclear operators
    - Doctoral and post-doctoral educational programs
French Higher educational system

Universities
European Bologna standard

Engineering Schools (ES)

Ph D

Engineering degree

Selective exams

Preparatory Classes

Master

3rd year
2nd year
1st year

Ph D

ES 3
ES 2
ES 1

Licence (bachelor)

M 2
M 1

Prepa 1
Prepa 2

L 3
L 2
L 1

Management and organization

Staff

• 113 residents only…
  • 92 in Saclay, 5 in Cherbourg (close to La Hague and Flamanville facilities), 6 in Grenoble (close to micro-electronics research facilities), 12 in Cadarache (research reactors, ITER), 5 in Marcoule (reprocessing research, decommissioning)
  • … but more than 1300 non-resident lecturers
    • From CEA as well as industrial partners
    • INSTM know-how: « teaching engineering » and integration of lecturers competencies in order to fulfill stakeholders needs

Saclay : 4 Educational Units

• Nuclear engineering
  • Simulators, ISIS training reactor, computer codes, radiochemistry facilities

• Materials science
  • Van de Graaf, nuclear instrumentation, metallography and surface analysis

• Radioprotection, Biology and nuclear medicine

• Management of innovation and economics
INSTN’s resources: INSTN’s pedagogical facilities

ISIS Training reactor - Saclay

Nominal Thermal Power : 700 kW
INSTN’s resources: Lab. Work : INSTN’s facilities

Reactors simulators for normal and accidental operating conditions
Computers and Industry codes

INSTN’s resources: Lab. Work : INSTN’s facilities

Electronic microscopes

Van de Graaff accelerator...
**INSTN’s facilities: Laboratory Work for students & trainees**

- Physics and chemistry active laboratories
- Radiobiology laboratories
- Radiation protection training facilities

**Diplomas: nuclear engineering**

- Ingénieur en Génie atomique = Nuclear Engineer Master degree
  - Typical French engineer degree, equivalent to master after the master degree
  - More than 4400 diplomas in more than 50 years
  - Recruitment end of an engineering school
  - 7 months theoretical and practical courses
    - 550 h: Nuclear physics, reactor physics, thermal hydraulics, fuel cycle, safety, …
  - 5 to 9 months internship in the industry or R&D

IAEA Technical Meeting December 10-14, 2007
Nuclear medicine and radioprotection

Nuclear medicine: specialty diplomas
- Diagnosis
  - Nuclear medicine speciality
  - Radiopharmaceutics speciality
  - Operator in nuclear medicine
- Therapy
  - Hospital physicist (radiotherapy supervisor)

Radioprotection: operator diplomas
- Operation technician (control, safety, …)
- Nuclear operators
  - Transport of nuclear materials, …
Master degrees and doctoral programme

- Close partnership with CEA labs and french universities
- In all fields of excellence of the CEA
  - Nuclear R & D, nuclear engineering
  - Fundamental physics and chemistry
  - Material science
  - Environmental science
  - Biology and medicine
  - Software science and simulation
  - Nanosciences
  - Fusion

- More than 1000 doctorate students at INSTN/CEA
  - Professionnal training, summer schools, …

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Professional training program

- Trainees from CEA (40%), nuclear industry and SME (55%), international (few %)
  - 2700 days, 8000 people per year
- Mainly nuclear field (some courses have to get certification), basic trainings
  - Radioactivity - nuclear measurements
  - PWR, operation, components, safety…
  - Nuclear cycle, waste management
  - Materials and physico-chemistry
  - Decommissioning
  - Security, nuclear safety, quality management
  - Radioprotection
  - Radiopharmaceutics, molecular biology, biochemistry
  - Renewable energy systems
  - Assistance for PhD students and managers
  - Innovation management
  - Education trainings
  - …
International cooperation: Education & professional training

- Every year: ~ 100 students
- Over 1 500 trainees since 1976
- Technical cooperation IAEA
- In Europe: “European Nuclear Education Network Association”

Examples of trainings organized upon request of the IAEA

- Regional Post-Graduate Educational Course on Radiation Protection and on the Safe Use of Radiation Sources
- Basic professional training course on nuclear safety
- Training needs assessment, Networking and materials for training courses in nuclear safety
- Train the trainers course in nuclear safety
International cooperation: European projects

- Radioprotection Master’s
- EMIL (European Master’s in Molecular Imaging) project
- ENEN (European Nuclear Engineering Network) project
- NEPTUNO (Nuclear European Platform of Training and University Organizations)

International Seminars

Training Course on Nuclear Safety

Saday, France
April 4th - 22nd, 2005

INTERNATIONAL SEMINAR ON NUCLEAR FUEL CYCLE

FRANCE
November 20th - December 1st, 2006