

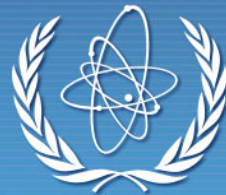
Educational Programme in Nuclear Security

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IAEA

International Atomic Energy Agency

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- European Nuclear Education Network Association (ENEN)
- Tomsk Polytechnic University (TPU)

Nuclear Security



Prevention



Detection



Response

Why is Nuclear Security today an international concern?

- Theft of nuclear weapon
- Theft of material to make improvised nuclear explosive device
- Theft of radioactive material for radiological dispersal device
- Sabotage of facility or transport



International Instruments

Legally binding:

- Convention on the Physical Protection of Nuclear Material & Amendment
- Safeguards agreements and additional protocols
- Convention on the Suppression of Acts of Nuclear Terrorism
- Security Council resolution 1540
- Security Council resolution 1373

Non-binding:

- Code of Conduct on the Safety and Security of Radioactive Sources

Amendment to the Convention
Physical Protection of Nuclear

IAEA International Law Series No. 2



 **IAEA**
International Atomic Energy Agency

Convention
on the Physical Protection
of Nuclear Material

CODE OF CONDUCT ON
THE SAFETY AND SECURITY OF
RADIOACTIVE SOURCES

放射源安全和保安行为准则

CODE DE CONDUITE SUR
LA SÛRETÉ ET LA SÉCURITÉ
DES SOURCES RADIOACTIVES

КОДЕКС ПОВЕДЕНИЯ ПО
ОБЕСПЕЧЕНИЮ БЕЗОПАСНОСТИ И
СОХРАННОСТИ РАДИОАКТИВНЫХ
ИСТОЧНИКОВ

CÓDIGO DE CONDUCTA
SOBRE SEGURIDAD TECNOLÓGICA
Y FÍSICA DE LAS FUENTES
RADIATIVAS

مدونة قواعد السلوك بشأن أمن المصادر
المتشعة وأمنها

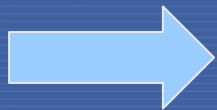
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Human Resource Development



Training Programme

Goal: Fill gaps between the actual performance of personnel and the required competencies and skills needed to meet the international requirements relating to nuclear security.



Educational Programme in Nuclear Security

Goal: Transfer in-depth and sustainable knowledge and skills in the area of nuclear security and foster nuclear security culture.



IAEA provides assistance to establish nuclear security at universities.

Educational Programme in Nuclear Security Development Process

The Educational Programme has been reviewed and revised:

- Two consultancy meetings (October 2007 and January 2008)
- One workshop (March 2008)
- Technical meeting (August 2008)
- Publication - Nuclear Security Series (Q4 2009)

<http://www-pub.iaea.org/MTCD/publications/ResultsPage.asp>

Educational Programme in Nuclear Security Objectives

- Support nuclear security sustainability in States
- Prepare professionals to carry out nuclear security assignments necessary to meet any obligations under the global nuclear security framework
- Provide guidance for developing academic nuclear security programmes
- Provide a comprehensive and current overview of nuclear security

Educational Programme in Nuclear Security Structure

- **Four chapters**
 - Introduction
 - Capacity Building in Nuclear Security - Human resource development
 - Description of the M.Sc. Programme
 - Description of the Certificate Programme
- **Two appendixes**
 - Recommended Courses for M.Sc. Programme in Nuclear Security
 - Appendix II. Recommended Courses for Certificate programme in Nuclear Security

M.Sc. Programme in Nuclear Security



- Programme compatible with requirements for Master's programme and Sorbonne/Bologna declaration
- Prerequisite to enter:
 - Bachelor degree, or any other equivalent degree and required knowledge in applied mathematics and nuclear physics, or successful completion of prerequisite courses in applied mathematics and nuclear physics;
- Four semesters (~200 hours of classes each):
 - First and second semester: required courses
 - Third semester: elective courses
 - Fourth semester: Pre-thesis practice and research & thesis preparation

Appendix I.



Prerequisite courses

- **NS.PR1. Applied mathematics**
- **NS.PR2. Basic nuclear physics**

Required courses

- **NS1. Introduction to nuclear security**
- **NS2. International and national legal framework regulating nuclear security**
- **NS3. Nuclear energy, nuclear fuel cycle and nuclear applications**
- **NS4 Methods and instruments for nuclear and other radioactive material measurements**
- **NS5. Effect of radiation, safety and radiation protection**
- **NS6. Threat Assessment**
- **NS7. Physical protection systems design and evaluation**
- **NS8. Physical protection technologies and equipment**
- **NS9. Security of nuclear and other radioactive material in transport**
- **NS10. Detection of criminal or unauthorized acts involving nuclear and other radioactive material out of regulatory control**
- **NS11. Interdiction of, and response to, criminal or unauthorized acts involving nuclear and other radioactive material**
- **NS12. Crime scenes investigation and forensic techniques**

Appendix I.

Con't



Elective courses:

- **NS13. Nuclear material accounting and inventory control of other radioactive material**
- **NS14. Vulnerability assessment of physical protection systems**
- **NS15. Risk assessment and management of State nuclear security measures**
- **NS16(a). Physical protection systems for nuclear and other radioactive material, sources and facilities**
- **NS16(b). Physical protection systems for radioactive material and sources**
- **NS17. Import/export and transit control mechanism and regime**
- **NS18. Nuclear security at major public events**
- **NS19. Nuclear forensics and attributions**
- **NS20. Infrastructure and procedures for detection and response to incidents involving nuclear or other radioactive material**
- **NS21. Cooperation of stakeholders at national and international level**
- **NS22. IT/Cyber-security**

Experts holding a Nuclear Security M.Sc. Degree

- *Tactical Planning and Operational Activities*
 - *Manage nuclear security at major facilities*
 - *Analyse national nuclear infrastructure*
 - *Develop strategy and arrange border control to detect and combat illicit trafficking*
 - *Design physical protection system and evaluate its effectiveness*
 - *Develop State's nuclear response plan and arrange respective response measures*
 - *Etc*



Certificate Programme



- One semester programme: specialists with an overview in all areas of nuclear security and with specialization in particular topics
- Content: most M.Sc. courses reduced to contain only essential information
- Prerequisites and selection of additional courses are defined by respective universities or institutions
- Flexible programme to meet different national needs

Specialists holding a Certificate in Nuclear Security

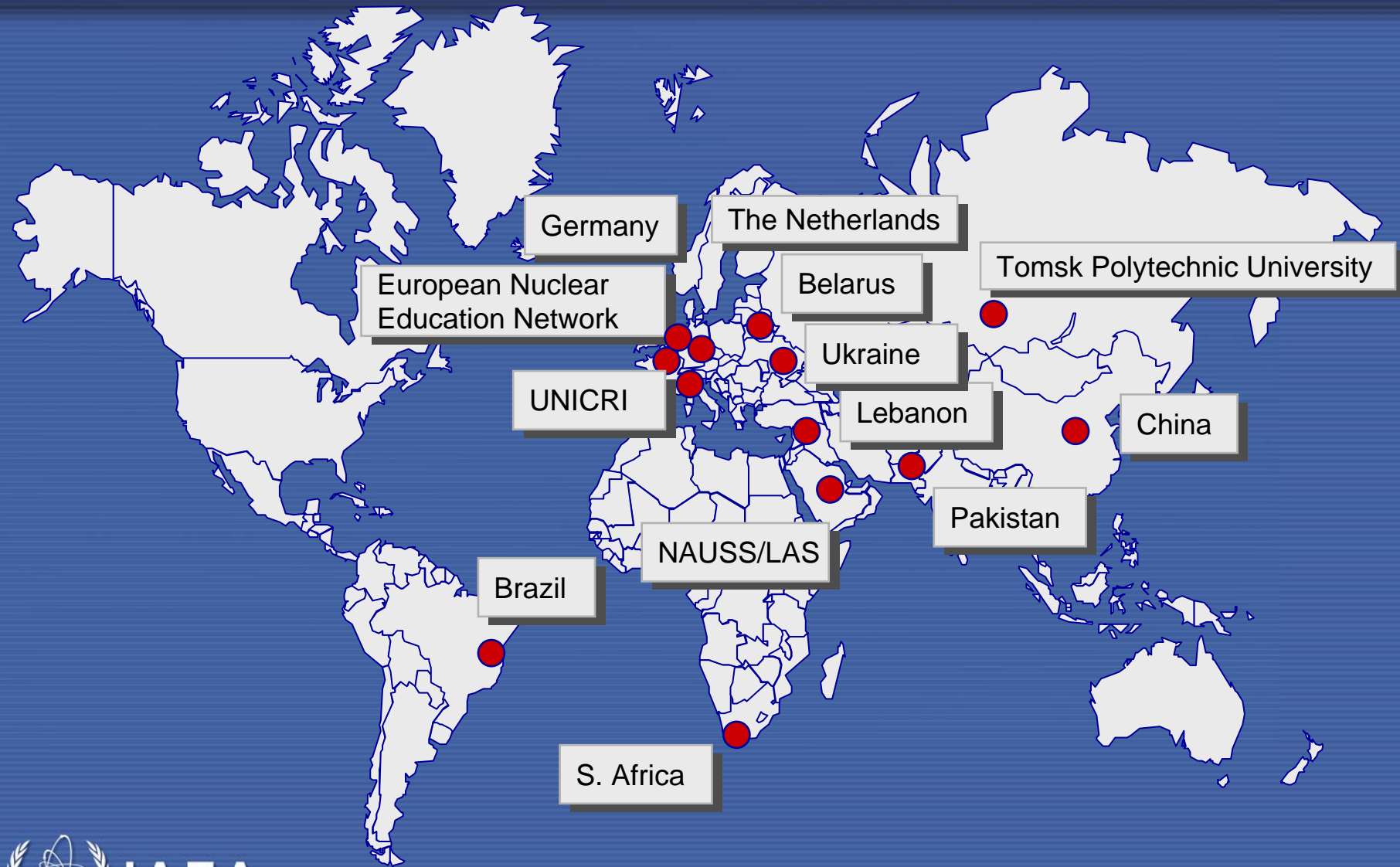
- Have a solid knowledge in all nuclear security areas
- Be able to prevent, detect malicious acts and response to incidents involving nuclear and other radioactive material
- Effectively support and sustain an established nuclear security system



Next Steps

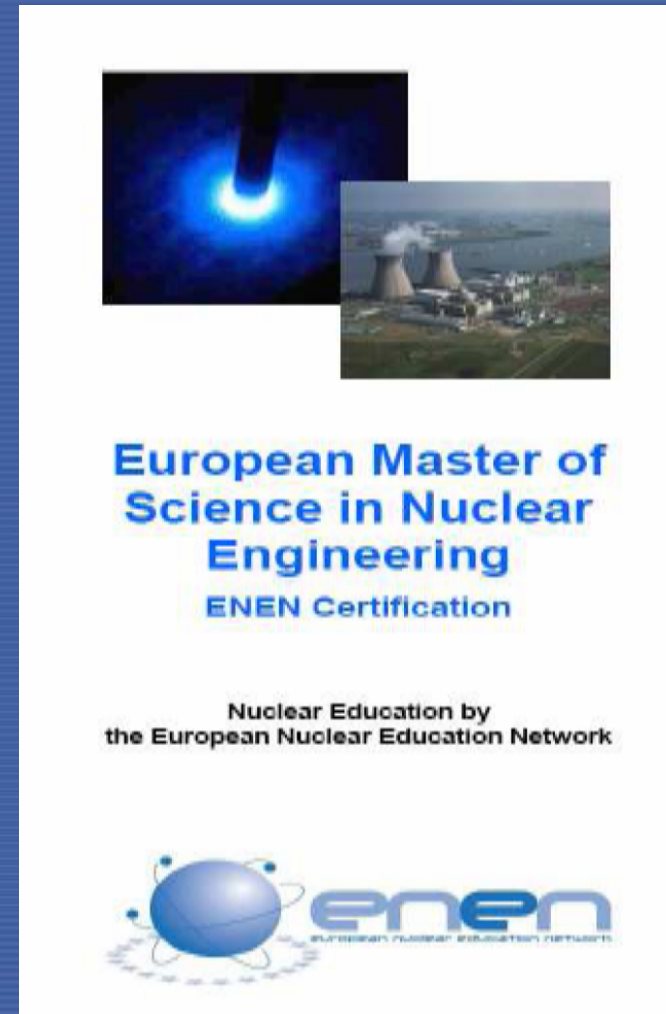
- Development of tailored academic programmes
- Development of textbooks & teaching material
- Implementation of academic programmes through visiting professors
- Education of university professors

Expressed Interest in Nuclear Security Education



European MSc in Nuclear Engineering

- Established under the European Commission – EURATOM 5th FP ENEN project and 6th FP NEPTUNO project
- Common reference curricula and mutual recognition among ENEN members
- Promotes and facilitates mobility of students and teachers
- Definition and assessment of ENEN international exchange courses
- Implemented since 2005
- “ENEN Certificate” recognised among ENEN Members



The image shows the cover of a brochure for the European Master of Science in Nuclear Engineering. At the top, there are two images: on the left, a glowing blue nuclear reactor core; on the right, an aerial view of a nuclear power plant with cooling towers. Below the images, the text reads: "European Master of Science in Nuclear Engineering" in large blue letters, followed by "ENEN Certification" in smaller blue letters. Further down, it says "Nuclear Education by the European Nuclear Education Network" in black. At the bottom, there is the ENEN logo, which consists of a blue sphere with orbiting lines and the acronym "ENEN" in blue, with "EUROPEAN NUCLEAR EDUCATION NETWORK" written in small black letters underneath.

Possible expansion of EMSNE in 2009

Revision of the EMSNE is currently under discussion in order to cover other nuclear disciplines

- Nuclear Security and Safeguards (IAEA, EC JRC Ispra, ESARDA) etc.
- Radiological Protection, Radiochemistry, Radioecology (under FP6 ENEN II project)
- Radioactive Waste, Geological Disposal (under ENEN II project)
- European Master in Radiation Protection (EMRP, led by CEA/INSTN Grenoble)

Tomsk Polytechnic University (TPU)



- Master Programme on Nuclear Control and Regulation since 2005
- Establishment of M.Sc. in Nuclear Security based on the IAEA Educational Programme in cooperation with the IAEA
 - Planned to be fully established by end 2012
 - Open to national and regional audience



Conclusion

- The risk of malicious acts involving nuclear and other radioactive material remains high
- This risk presents serious threat to international peace and security
- For the reduction of this risk adequate university level education in the area of nuclear security is essential to assure international peace and security