A proposal for a new ERASMUS Intensive Program in Industrial Radiography

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Aim of this proposal

"... to bring together students and teaching staff from the 10-12 higher education institutions participating in CHERNE, for a 10 continuous full days course regarding state-of-the-art industrial radiography."
Proposal presentation summary

1. Characteristics
2. Curriculum main components
3. Available laboratory equipment
4. Other business and extras
Proposal characteristics (1)

-compliant to ERASMUS norms-

1. IP to be repeated over two or three consecutive years

2. Two weeks duration education programme, 10 full working days, 9:00 to 17:00 schedule, one hour break for lunch in the premises, free weekends

3. Efficient ratio of staff to students (suggested optimum student team of 12 to 18)

4. Active classroom participation using questions and answers, example problems and short exercises, hands-on laboratory work
Proposal characteristics (2)

5. Multinational teaching (up to two students from each CHERNE participating institution, instructing lecturers selected and invited also from CHERNE institutions)

6. ICT tools and services to support the preparation and the follow-up of the IP (web page, on-line application, printed and electronic teaching material)

7. IP to be specifically designed for 3\textsuperscript{rd}, 4\textsuperscript{th} year BSc students and MSc students; Doctoral students may be considered as well in case they show interest.
Proposal characteristics (3)

8. Students original discipline may be of Mechanical Engineering, Naval Engineering, Materials Engineering, Chemical Engineering, Physics and/or Medical Imaging. Other disciplines may be considered according to applications

9. Continuous education students, maybe accepted if such provision could be included in IPs

10. Courses will be given in English
Proposal characteristics (4)

11. Students gains out of the IP would be: (a) sound resultant principles and theoretical knowledge out of serially taught relevant components, (b) hands-on practical experience and familiarization with NTUA's available equipment to be found also in professional field, (c) radiation protection rules understanding and ALARA in practice, and finally (d) very good preparation for a Level II inspector course in radiography.

12. Diploma Thesis applications in NTUA and other CHERNE participating Institutions resulting out of this IP, could be considered in the frame of bilateral ERASMUS agreements as well.
Curriculum main components (1)

Week – A (Classroom)

Orientation – Summary review of common acquired and existing knowledge from home institutions -
Curriculum main components (2)

Week – A (Laboratory work 1)

Radiography vault details and visit (principles of radiation protection, shielding, control zone, supervision zone, general public zone, safety and security features, door switches, panic buttons, CCTV, warning lights, warning sounds) – Dark room details and visit (darkness control, development in progress warning light, light lock, near infra-red lights, automatic film development equipment, manual film development equipment)
Curriculum main components (3)

Week – A (Laboratory work 2)

Film basics description, "Fast" and "Slow" films, Hands-on manual film development (developer solution preparation, fixer solution preparation, temperature considerations, development of a fully exposed film in ambient light conditions to familiarize with the procedure, development of a non-exposed film in darkness to familiarize with darkness)
Curriculum main components (4)

Week – A (Laboratory work 3)

Hands-on automated film development (developer solution preparation, fixer solution preparation, NOVA automated film processor set-up for film development, development of a fully exposed film in ambient light conditions to familiarize with the procedure, development of a non-exposed film in darkness to familiarize with darkness)
Curriculum main components (5)

Week – B (Classroom)

Week – B (Laboratory work 4)

Industrial radiography simulation using the XRSIM software platform (simple examples of simulated problems regarding exposure, development of simulated radiography specimens in CAD software, selection of film type, selection of source-to-film distance, selection of photon source, image analysis, image manipulation)
Curriculum main components (6)

Week – B (Laboratory work 5)

Actual stepwedge specimen radiography (optimum exposure calculation, film radiography, film development, digital radiography, image manipulation, discussion, results and conclusions) – Repeat experiment for a pipe pinhole flaw
Available laboratory equipment (1)

GE Inspection and Sensing Technologies
X-Ray Source
ERESCO MF42 (200 kV)
Available laboratory equipment (2)

GE Inspection and Sensing Technologies
NOVA (Agfa)
Film Processor
Type: 7070/100
Available laboratory equipment (3)

Kowolux 4X Film Viewer
205x85 mm for Welding Film
Available laboratory equipment (4)

**Densitometer**

**Digit-X**

by

**Fidgeon Ltd**
Available laboratory equipment (6)

Hewlett Packard
Scanjet G4050
Available laboratory equipment (7)

NTB GmbH
Linear
X-RAY Scanners, Electronics & Manipulators.
Purchased, now under deployment
Available laboratory equipment (8)

NEC
Ultra High Resolution
Digital (Medical)
Radiography
Monitors:
MDview271 & MD212MC
Available equipment (9)

In addition:

1. Independent and adequate classroom with all necessary audio visual means

2. Image quality indicators (after DIN), lead letters and numbers, densitometer calibration film, spatial resolution specimens

3. CNC controlled X-Y table for tomography

... and you are welcome to see more during your visit in the Lab.
Other business and extras

1. A visit to Corinth Pipeworks SA can be scheduled to observe digital radiography equipment in production line

2. Social programme available through the local Erasmus students contacts

3. All other suggestions welcome
Proposed IP Outlook

1. Provides learning opportunities, skills development and promotes curricular integration

2. Supports team work of students and instructors in multinational groups

3. Tests teaching methods in an international classroom environment

4. Introduces specialist topics, which might otherwise not be taught at all in home institutions

... and you will certainly help me, if I miss something here.
Thank you very much for your attention!