Specialised training module 7: Medical applications

1. Background of the ENETRAP training modules

The ENETRAP project series (FP7 grant agreement n° 605159) developed a European radiation protection training scheme (ERPTS) for RPEs, consisting of three common basis modules, several optional modules and some add-on modules. This specialised training module (N°7: Medical applications) is optional and advances on the knowledge, skills and competences acquired in the three basic modules. The module consists of a number of training courses which are linked to specific competences and activities that a Radiation Protection Expert (RPE) requires in compliance with Council Directive 2013/59/Euratom (BSS).

2. Training module objective

The course participant will gain the knowledge, skills and attitudes to provide expert radiation protection advice to employers, staff and members of the public that will allow him or her to seek the status of Radiation Protection Expert (RPE) from an authorised body in the medical fields of radiotherapy, diagnostic & interventional radiology and nuclear medicine.

3. Module overview

The Module on medical applications consists of four training courses.

Course 7.1	Medical workplace study
26	**Apply the principles of operational radiation protection in medicine**
26.1	Carry out work place study
26.2	Conduct a risk analysis (all types)
26.3	Perform staff training
26.4	Participate in the design of new activities
26.5	Analyse new situation of occupational exposure (exposed workers or not) in the case of new techniques (i.e. Samarium combined with dialysis of an injected patient)
26.6	Manage solid/liquid and gaseous waste
Course 7.2	Hospital organisation and RP roles and duties
27	**Know the organisation of the hospital (local) and relationship with the head of the establishment**
27.1	Advise the hospital security (security guard) in case of fire in relation to the presence of radioactive sources
27.2	Advise on the intervention of Technical Services (i.e. clogged toilets and presence of I131)
27.3	Know all personnel involved directly and indirectly with ionising radiation sources
27.4	Manage relations with the occupational medicine service

27.5	Manage personal dosimetry service and dose recording procedure
27.6	Manage radiation accidents and incident
Course 7.3	Stakeholders interactions
28	**Manage the interaction with stakeholders**
28.1	Manage relationships with the regulatory body
28.2	Manage the authorisation to possess radioactive sources
28.3	Manage the declaration statements to possess radioactive sources
28.4	Manage the changes of installation file
28.5	Manage records for the implementation of new technics / installation (e.g. for intraoperative breast cancer)
28.6	Adapt existing installation (or old) to changes in regulation
28.7	Manage relationships with an organisation's management
Course 7.4	Quality control and quality assurance in radiation protection in the medical sector
29	**Quality Control/Quality Assurance and dosimetric assessment for radiation protection in the medical sector**
29.1	Perform dosimetric quality control and quality assurance assessment of radiation protection equipment

4. Marking and assessment criteria

Each of the 4 courses requires the production of a portfolio consisting of a number of short reports with appropriate evidence to demonstrate the knowledge (K), skills (S) and attitudes (A) of an RPE.

The length of each portfolio should not exceed 2500 words (plus evidence sheets) and should therefore be of high quality.

Each portfolio will be discussed in an open forum during the face to face phase of the course module (around 20 minutes per portfolio) providing an interactive learning forum. The portfolio may be revised, if appropriate, following this session and submitted before the last day of the face to face phase of the module. The candidates will be asked questions relating to their portfolios on the last day of the module and the portfolios plus oral examinations must be assessed as fulfilled for the candidate to pass the skills (S) and attitudes (A) parts of each course.

There will be a one hour written examination on the last day of the face to face module that will consists of a multiple choice examination to assess knowledge (K) (70% pass-mark) showing a detailed understanding of the subject.

The candidate must pass all three components (K, S, A) to pass each course. The candidate must also pass all 4 courses to pass the Medical Module.

Evaluation Procedure		
Evaluation Question	**Judgement Criteria**	**Indicators and Descriptors**
To what extent has the course module participant achieved the required RPE KSAs in medical applications?	The participant's level of achievement of the course module KSAs will be judged by their grade (marks) from	An overall grade (mark) of: <50% indicate a need for further development. 50 – 70% the course

	the written examinations.	module participant has average knowledge and some experience, however, they should upgrade their KSAs to increase their level of qualification. >70% the course module participant has sufficient knowledge and experience.

5. Pre-requisites

The applicant will be expected to have achieved:
(i) An education to level 6 of the European Qualification Framework (EQF) (e.g. Bachelor degree level either specifically in radiation protection, or in a physical/engineering/mathematical discipline orequivalent through life long learning)

AND
(ii) A minimum of 3 years' experience working in radiation protection environment.

The applicant will be expected to have completed the following 3 generic ENETRAP III modules as pre-requisites for the Medical Module (see below for alternative pre-requisites):

Basic training module 1: Basics
1.1 Radioactivity and Nuclear Physics
1.2 Interaction of radiations with matter
1.3 Dosimetry: quantities and units
1.4 Biological effects of radiations
1.5 Physical principles of detection

Basic training module 2: Foundation
2.1 Application of ionising radiation
2.2 Radiation protection
2.3 Radiation protection internal dosimetry
2.4 Protection against external exposure
2.5 Dose monitoring
2.6 Regulatory context
2.7 Natural sources of ionising radiation
2.8 Public and environmental radiation protection
2.9 Ethical considerations

Basic training module 3: Occupational
3.1 Transport
3.2 Design issues
3.3 Accidents and emergency issues
3.4 Safety culture
3.5 Waste management
3.6 ALARA culture

Accreditation of Prior Certificated Learning (APCL), which covers learning that has been assessed and certificated by an education or training system, will be considered where appropriate, e.g. the applicant has been awarded a Bachelor or Master's degree whose contents demonstrates the above components had been covered and examined. Alternatively, applicants who can demonstrate equivalent achievement through Life Long Learning (LLL) will also be considered. APCL or LLL applications should be made to the Medical Module co-ordinator before starting the module.

6. Learning outcomes, indicators from EQF and suggested reading per training course

Legend:

Competence	**26**	**Apply the principles of operational radiation protection in medicine**
Training course	7.1	Medical workplace study
Activity	26.1	Carry out work place study
Learning outcome in terms of knowledge (K), skills (S) or attitude (A)	LO K 26.1.1	Identify the various medical techniques using ionising radiation sources

26	**Apply the principles of operational radiation protection in medicine**
Course 7.1	Medical workplace study
26.1	Carry out work place study
Knowledge (Prior reading requirements)	
LO K 26.1.1	Identify the various medical techniques using ionising radiation sources
LO K 26.1.2	Identify the actions of practitioners in relation to the use of ionising radiation sources
LO K 26.1.3	Identify the methodology of work place training programmes
LO K 26.1.4	Identify the international/national regulations that apply in the workplace
LO K 26.1.5	Identify the radiation protection measurement techniques
LO K 26.1.6	Identify the limitations of monitoring devices (e.g. for a pulsed field or in a field with low energy)
Skills (Portfolio contents)	
LO S 26.1.1	Demonstrate application of the regulations
LO S 26.1.2	Perform measurements of dose rate
LO S 26.1.3	Perform or describe how to measure contamination
LO S 26.1.4	Perform or describe how to perform calculations of protective shielding
LO S 26.1.5	Perform or describe how to calculate exposure time limits according to a source
LO S 26.1.6	Perform or describe how to calculate individual and collective dosimetry
LO S 26.1.7	Describe how to schedule measurements campaigns without disrupting service
Attitude (Portfolio evidence)	
LO A 26.1.1	Discuss the usefulness and relevance of work place study with health staff
LO A 26.1.2	Show engagement with health staff to schedule measurements campaigns without disrupting service

26.2	Conduct a risk analysis (all types)
Knowledge (Prior reading requirements)	
LO K 26.2.1	Identify the methodology for conducting a radiological work place zoning (controlled / supervised areas)
LO K 26.2.2	Identify the general and dedicated RP regulations for conducting risk assessments
LO K 26.2.3	Identify the risk assessment techniques
LO K 26.2.4	Identify the various technologies of detection devices
LO K 26.2.5	Identify the individual and collective protective equipment
LO K 26.2.6	Identify the issues related to nuclear ventilation and air contamination in nuclear medicine
LO K 26.2.7	Identify the limits of detection devices in a pulsed field or a field with low energy
Skills (Portfolio contents)	
LO S 26.2.1	Present a suitable dosimetry survey on individuals (e.g. TLD badges)
LO S 26.2.2	Perform or describe decontamination procedures
LO S 26.2.3	Present a suitable collective dosimetry survey (e.g. eye dose monitoring)
LO S 26.2.4	Communicate risk perception to staff and members of the public
LO S 26.2.5	Perform an assessment of new personal protective equipment, dosimeters
LO S 26.2.6	Examine the problem of hygiene (e.g. sterilisation TLD rings)
LO S 26.2.7	Produce proposals for new personal protective equipment
LO S 26.2.8	Investigate the position of sampling points for atmospheric and aqueous discharges (e.g. liquid effluents discharged to the drainage system)
Attitude (Portfolio evidence)	
LO A 26.2.1	Guide on Radiation Protection issues
LO A 26.2.2	Advise on the training required on radiation protection
LO A 26.2.3	Negotiate and exchange ideas about hygiene protocols (e.g. consumption of food and drinks when unsealed sources present etc.)
LO A 26.2.4	Motivate staff towards protection devices and testing (glass, lead apron, leaded glass, gloves, surgical sterile and sealed ...)
LO A 26.2.5	Engage with the medical physics expert responsible for patient dosimetry showing the distinction between patient dosimetry (not RPE) and dosimetry of workers and the public
26.3	Perform staff training
Skills (Portfolio contents)	
LO S 26.3.1	Create a radiation protection training programme for staff
LO S 26.3.2	Apply appropriate training techniques
Attitude (Portfolio evidence)	
LO A 26.3.1	Communicate effectively with staff
26.4	Participate in the design of new activities
Skills (Portfolio contents)	
LO S 26.4.1	Perform shielding and predictive dosimetry calculations
LO S 26.4.2	Compute the environmental impact (nuclear medicine)

Attitude (Portfolio evidence)	
LO A 26.4.1	Engage staff in relation to new techniques
26.5	Analyse the situation of occupational exposure of staff involved in the case of new techniques (e.g. nurses involved with dialysis of patients administered with radionuclides in a new situation)
Knowledge (Prior reading requirements)	
LO K 26.5.1	Identify the decontamination techniques for unforeseen situations (e.g. incontinent patient, vomiting)
Skills (Portfolio contents)	
LO S 26.5.1	Synthesise decontamination of a surface (e.g. urine)
Attitude (Portfolio evidence)	
LO A 26.5.1	Promote a reactive attitude towards contamination events
26.6	Manage solid/liquid and gaseous waste
Knowledge (Prior reading requirements)	
LO K 26.6.1	Identify the regulations relating to discharges

Indicators from EQF	
Knowledge	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research - Critical awareness of knowledge issues in a field and at the interface between different fields
Skill	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields
EQF Level	7
ECVET Credit Points	1.5
Proposed Duration	40 hours pre course 6 hours face to face Total 46 hours
	The pre-course phase will consist of self-study during which a portfolio will be prepared. The face to face phase of the course will consist of two lectures on radiological protection in the medical sector; measurement techniques and activities, and, risk assessments and safety.

Suggested reading
IAEA Human Health Series No. 25; Roles and Responsibilities, and Education and Training Requirements for Clinically Qualified Medical Physicists http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1610_web.pdf accessed 12 July 2015
Radiation protection N° 175. Guidelines on radiation protection education and training of medical professionals in the European Union https://ec.europa.eu/energy/sites/ener/files/documents/175.pdf

accessed 12 July 2015
Official Journal of the European Union; Council Directive 2013/59/EURATOM, of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013L0059&from=EN accessed 12 July 2015
IAEA Safety Standards; Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards; General Safety Requirements Part 3 No. GSR Part 3 http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1578_web-57265295.pdf accessed 12 July 2015
ICRP publications in radiological protection: http://www.icrp.org/publications.asp accessed 12 July 2015
The Health and Safety Executive Five steps to risk assessment http://www.rospa.com/rospaweb/docs/campaigns-fundraising/hse-five-steps-to-risk-assessment.pdf accessed 12th July 2015
Radiation Oncology Physics: A Handbook for Teachers and Students http://www-pub.iaea.org/MTCD/publications/PDF/Pub1196_web.pdf accessed 27th July 2015
Diagnostic Radiology Physics A Handbook for Teachers and Students http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1564webNew-74666420.pdf accessed 27th July 2015
Nuclear Medicine Physics A Handbook for Teachers and Students http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1617web-1294055.pdf accessed 27th July 2015

27	**Know the organisation of the hospital (local) and relationship with the head of the establishment**
Course 7.2	Hospital organisation and RP roles and duties
27.1	Advise the hospital security (security guard) in the case of fire in relation to the presence of radioactive sources
	Knowledge (Prior reading requirements)
LO K 27.1.1	Identify the basics rules in respect of radiation protection related to fire (understand the basic requirements related to fire protection)
LO K 27.1.2	Identify relevant legislation and codes of practice in the relevant medical area (diagnostic radiology, dentistry, nuclear medicine, radiotherapy)
	Skills (Portfolio contents)
LO S 27.1.1	Assess the fire contingency plans in local rules of departments and hospital
LO S 27.1.2	Develop and apply radiation protection roles and duties for security staff
	Attitude (Portfolio evidence)
LO A 27.1.1	Allocate the distinct roles among members of staff
LO A 27.1.2	Engage with staff demonstrating an open minded attitude (i.e. team

	building)
LO A 27.1.3	Appreciate the impact on staff, patients and members of the public when providing objective radiation protection advice
LO A 27.1.4	Engage staff and senior management to promote a positive safety culture
27.2	Advise on the intervention of Technical Services (e.g. clogged toilets and presence of I-131)
Knowledge (Prior reading requirements)	
LO K 27.2.1	Identify the requirements of the regulations, licence and local rules as they affect the work the Radiation Protection services
LO K 27.2.2	Identify the necessary precautions to be taken in the work that is being done and the extent to which these precautions will restrict exposures
LO K 27.2.3	Understand radiation safety policies and documentation distributed to relevant staff and how they are implemented
Skills (Portfolio contents)	
LO S 27.2.1	Establish basic rules for the intervention of Technical Services
Attitude (Portfolio evidence)	
LO A 27.2.1	Advise and adjust the intervention steps with staff
27.3	Know all personnel involved directly and indirectly with radioactive sources
Knowledge (Prior reading requirements)	
LO K 27.3.1	Identify the radiation protection rules at the level of department and who is responsible for what in the department
LO K 27.3.2	Identify the personnel at a hospital level
LO K 27.3.3	Identify all associated personnel at a national level
Skills (Portfolio contents)	
LO S 27.3.1	Contact staff responsible for specific radioactive sources
Attitude (Portfolio evidence)	
LO A 27.3.1	Advise relevant regulatory aspects with appropriate staff
LO A 27.3.2	Establish the difference in tasks of the RPE and the MPE and the boundaries where they connect
27.4	Manage relations with the occupational medicine service
Knowledge (Prior reading requirements)	
LO K 27.4.1	Identify the basics in organisation and management related to occupational medicine service
LO K 27.4.2	Recognise the law and ethics related to occupational medicine services
Skills (Portfolio contents)	
LO S 27.4.1	Present radiation safety information in a clear manner
LO S 27.4.2	Organise and maintain a record keeping system to facilitate good relationships
Attitude (Portfolio evidence)	
LO A 27.4.1	Preserve good relations and cooperation with the occupational medicine service
LO A 27.4.2	Appreciate the impact on staff

27.5	Manage personal dosimetry service and dose recording procedure
Knowledge (Prior reading requirements)	
LO K 27.5.1	Identify the basics of personal monitoring
LO K 27.5.1	Identify the basics of dose recording
Skills (Portfolio contents)	
LO S 27.5.3	Generate a record keeping system which is clear to the occupational workers
LO S 27.5.5	Examine personal doses and ensure that these are consistent with dose constraints definition
LO S 27.5.6	Investigate if all appropriate measures are taken to control the exposure of a pregnant employee and breastfeeding in nuclear medicine
LO S 27.5.7	Investigate the effect of personal dosimetry on the optimisation of radiation safety culture
Attitude (Portfolio evidence)	
LO A 27.5.1	Guide on activities to evaluate the impact on staff from all issues relating to personal dosimetry
LO A 27.5.2	Manage activities to effectively interact with staff
LO A 27.5.3	Organise all radiation safety information in a clear manner
LO A 27.5.4	Act in a positive manner with regulatory agencies in case of any problems with increased levels of occupational radiation dose
27.6	Manage radiation accidents and incidents
Knowledge (Prior reading requirements)	
LO K 27.6.1	Identify the principles of emergency response planning for medical radiation accidents and incidents
LO K 27.6.1	Identify the principles of emergency response planning for large-scale events such as a terrorist attacks, earthquakes and fires involving radioactive or nuclear materials
Skills (Portfolio contents)	
LO S 27.6.1	Produce all related items for the medical response to radiological accidents and incidence
LO S 27.6.2	Produce guidance to staff on decontamination of patients, facilities, and the vehicles in which patients were transported
LO S 27.6.3	Monitor and assist local public health authorities in monitoring people who are not injured but who have been or are concerned that they may have been exposed to radioactive materials or radiation as a result of the incident (bench-top exercise)
LO S 27.6.4	Produce the register of sources
Attitude (Portfolio evidence)	
LO A 27.6.1	Manage activities in the case of radiological accidents with staff
LO A 27.6.2	Advise on the level of radiological contamination in or on incoming victims (bench-top exercise)
LO A 27.6.3	Guide medical staff evaluating the levels of radioactivity they are dealing with.
LO A 27.6.4	Guide medical staff when dealing with radioactive contaminants

Indicators from EQF	
Knowledge	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research - Critical awareness of knowledge issues in a field and at the interface between different fields
Skill	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields
EQF Level	7
ECVET Credit Points	1.5
Proposed Duration	40 hours pre course 6 hours face to face Total 46 hours
	The pre-course phase will consist of self-study during which a portfolio will be prepared. The face to face phase of the course will consist of two lectures on radiological protection in the medical sector; personnel monitoring, and, radiation accidents and incidents.

Suggested reading
Requirements for the approval of dosimetry services under the ionising radiations regulations 1999, Health and Safety Executive, UK revised 2008 http://www.hse.gov.uk/radiation/ionising/dosimetry/requirements-pt1.pdf accessed 12th July 2015
Release fractions for radioactive sources in fires, FS/99/19, Health and safety laboratory, Health and Safety Executive http://www.hse.gov.uk/research/hsl_pdf/2002/fractrad.pdf accessed 12th July 2015
Fire and Rescue Service Operational Guidance: Generic Risk Assessment 5.5 Incidents involving radiation January 2011 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/9395/1829974.pdf accessed 12th July 2015

28	**Manage the interaction with stakeholders**
Course 7.3	Stakeholders interactions
28.1	Manage relationships with the regulatory body
Knowledge (Prior reading requirements)	
LO K 28.1.1	Identify the interactions with the health authority (national and regional)
28.2	Manage the authorisation to possess radioactive sources
Knowledge (Prior reading requirements)	
LO K 28.2.2	Identify the sources of ionising radiation owned by the organisation
Skills (portfolio contents)	
LO S 28.2.1	Assess the technical aspects of the Waste Management

	(liquid, gaseous and solid)
LO S 28.2.2	Analyse discharge permits
LO S 28.2.3	Assess how the organisation's radioactive waste is managed
	Attitude (portfolio evidence)
LO A 28.2.1	Advise management in relation to regulations
28.3	Manage the declaration statements to possess radioactive sources
	Knowledge (Prior reading requirements)
LO K 28.3.1	Identify the procedures for completing applications for possession of ionising radiation sources and necessary changes to existing licences
	Skills (portfolio contents)
LO S 28.3.1	Complete an application form for a new sealed source (If the application form is in a language other than English, translate into English the main parts)
	Attitude (portfolio evidence)
LO A 28.3.1	Advise management on the necessary legal application procedures
28.4	Manage the changes of installation file
	Knowledge (Prior reading requirements)
LO S 28.4.1	Identify the requirements for completion of installation files, records for new techniques and adaptation of existing installations to meet the requirements of changes in legislation
	Skills (portfolio contents)
LO S 28.4.1	Summarise the content of a dental x-ray system installation file
	Attitude (portfolio evidence)
LO A 28.4.1	Advise management on the necessary chances to replace a dental x-ray system with a Cone Beam Computer Tomography (CBCT) for dental applications
28.5	Manage records for the implementation of new techniques / installation (e.g. for intraoperative breast cancer)
	Knowledge (Prior reading requirements)
LO K 28.5.1	Identify the records required for a new technique (e.g. intraoperative breast cancer)
	Skills (portfolio contents)
LO S 28.5.1	Present a flowchart of the steps required to implement a new installation
	Attitude (portfolio evidence)
LO A 28.5.1	Audit the records prepared by the Technical Department of an organisation for a new installation (e.g. Mammography system for breast screening programme)
28.6	Adapt existing installation (or old) to changes in regulation
	Skills (portfolio contents)
LO S 28.6.1	Develop relationships with recognised organisations
LO S 28.6.2	Develop internal and external RP controls
LO S 28.6.3	Assess the technical aspects of bidding contracts for radiation protection
LO S 28.6.4	Complete an application for the approval of the installation and use of a new PET/CT in the organisation.

28.7	Manage relationships with an organisation's management
Knowledge (Prior reading requirements)	
LO K 28.7.1	Recognise the organisations management and operational structures
LO K 28.7.2	Administer employment conditions for pregnant and breastfeeding workers
Skills (portfolio contents)	
LO S 28.7.1	Address relationships with an organisation's personnel
LO S 28.7.2	Determine employment conditions for pregnant and breastfeeding workers
LO S 28.7.3	Generate a policy with respect to pregnant and breastfeeding workers
LO S 28.7.4	Describe an organisation's management structure and identify the officers who have obligations with respect to the radiation protection legislation in your country. Also list their obligations.
Attitude (portfolio evidence)	
LO A 28.7.1	Advise management in relation to the regulatory obligations of an organisation
LO A 28.7.2	Consult management on employment conditions for pregnant and breastfeeding workers

Indicators from EQF	
Knowledge	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research - Critical awareness of knowledge issues in a field and at the interface between different fields
Skill	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields
EQF Level	7
ECVET Credit Points	1.5
Proposed Duration	40 hours pre course 6 hours face to face Total 46 hours
Notes	The pre-course phase will consist of self-study during which a portfolio will be prepared. The face to face phase of the course will consist of two lectures, on radiological protection in the medical sector; the interaction with stakeholders, and, the legal obligations of the organisation's management

Suggested reading
Council Directive 2013/59/EURATOM, of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom, OJ L13, 17.01.2014, pp 1-73, http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013L0059&from=EN accessed 12 July 2015

IAEA Safety Standards; Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards; General Safety Requirements Part 3, No. GSR Part 3 http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1578_web-57265295.pdf accessed 12 July 2015
IAEA Safety Standards Series No.GSG-1, Classification of Radioactive Waste, General Safety Guide, Vienna, 2009, http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1419_web.pdf accessed 12 July 2015
Radiation Protection Report No. 122, "Practical Use of the Concepts of Clearance and Exception-Part 1, Guidance on General Clearance Levels for Practices" https://ec.europa.eu/energy/sites/ener/files/documents/122_part1.pdf accessed 12 July 2015
Radiation Protection Report No. 175 "Guidelines on Radiation Protection Education and Training of Medical Professionals in the European Union", https://ec.europa.eu/energy/sites/ener/files/documents/175.pdf accessed 12 July 2015
Radiation Protection Report No. 131 "Effects of in utero exposure to ionising radiation during the early phases of pregnancy", https://ec.europa.eu/energy/sites/ener/files/documents/131.pdf accessed 12 July 2015

29	**Quality Control/Quality Assurance and dosimetric assessment for radiation protection in the medical sector**
Course 7.4	Quality control and quality assurance in radiation protection in the medical sector
29.1	Perform dosimetric quality control and quality assurance assessment of radiation protection equipment
Knowledge (Prior reading requirements)	
LO K 29.1.1	Identify the dosimetric quantities and associated relevant concepts and how to perform QA
LO K 29.1.2	Identify the efficiency of protective equipment and how to test it in the field and perform QA/QC
LO K 29.1.3	Identify the QC requirements for operating a personal dosimetry and multi-modality devices/services
LO K 29.1.4	Identify the QC requirements for dosimetric calculations of internal contamination and external exposure, especially in the multi-disciplinary environment
LO K 29.1.5	Identify the QC techniques for neutron radiation
Skills (Portfolio contents)	
LO S 29.1.1	Demonstrate the ability to apply QC techniques for measuring scattered radiation
LO S 29.1.2	Check the performance of contamination survey instruments

LO S 29.1.3	Check the performance of devices for survey monitoring (including devices used for pulsed fields and neutrons where appropriate)
LO S 29.1.4	Organise management programmes for internal contamination
LO S 29.1.5	Organise QC of protection devices for external radiation (IEC norm)
LO S 29.1.6	Evaluate and Interpret occupational doses and how to optimise
LO S 29.1.7	Test leakage of encapsulated sources
LO S 29.1.8	Produce a management programme for short lived radioactive waste
Attitude (Portfolio contents)	
LO A 29.1.1	Promote good working practices for QC programmes for occupational radiation protection

Indicators from EQF	
Knowledge	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research - Critical awareness of knowledge issues in a field and at the interface between different fields
Skill	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields
EQF Level	7
ECVET Credit Points	1.5
Proposed Duration	40 hours pre course 6 hours face to face Total 46 hours
	The pre-course phase will consist of self-study during which a portfolio will be prepared. The face to face phase of the course will consist of two lectures, on radiological protection in the medical sector; quality control, and, dosimetry.

Suggested reading
Requirements for the approval of dosimetry services under the ionising radiations regulations 1999, Health and Safety Executive, UK revised 2008 http://www.hse.gov.uk/radiation/ionising/dosimetry/requirements-pt1.pdf accessed 12th July 2015
Review of the level of accuracy required and means of demonstrating that accuracy for approval of dosimetry services by the Health and Safety Executive http://www.hse.gov.uk/research/rrpdf/rr477.pdf accessed 27th July 2015
Quality Assurance in Radiation Dosimetry: Achievements and Trends https://www.iaea.org/About/Policy/GC/GC53/GC53InfDocuments/English/gc53inf-3-att2_en.pdf accessed 27th July 2015