

# **SCK•CEN's international school for Radiological Protection (isRP): Communicating the aspects of radiological protection**

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## **Abstract**

Radioactivity has always been around us. Since the early discoveries by Marie Curie, Henri Bequerel, Albert Einstein and many others, a deep insight into the risks and benefits of applying radioactivity in daily commercial and research practice has been build up. The scientific world of radiological protection is in constant motion, triggered by new research as well as by developments and events in the industrial and medical sectors. In addition, national and international regulatory policies try to streamline and guide everyday practice toward procedures to guarantee the protection of workers and the public and, at the same time, ensure optimisation of all peaceful applications of radioactivity. To this end, harmonisation and coordination are sense of the utmost importance, not only 'on the work floor', but also with regard to education and training. In this spirit, the isRP organises courses on a wide variety of radiological protection topics and – in parallel – aims to play a role in national and international policy-making with regard to related education and training.

## **1. Introduction**

Thanks to its thorough experience in the field of peaceful applications of nuclear science and technology, radiological protection and radiobiology, the Belgian nuclear research centre SCK•CEN has garnered a reputation as an outstanding centre of research, training and education. Functioning as a task force within SCK•CEN, the international school for Radiological Protection (isRP) initiates and manages training and research projects and contributes to related activities on national and international level.

isRP's activities are situated on three axes:

### ***- Coordination and organisation of training and education programmes on radiological protection***

The isRP training activities deal with all aspects of radiological protection and are directed to the private, medical and industrial nuclear sector, national and international policy organisations, the political and academic world and the general public. Courses are also organised in cooperation with technical universities, universities and public and private health services. In addition, isRP is involved in international research networks and training programmes, such as those of the European Commission and the IAEA.

The isRP team of lecturers includes technicians, physicists, biologists, medical doctors, engineers and social scientists, who all bring insights and ideas from their specific background into the course programmes. As SCK•CEN staff members, they have a solid knowledge and experience in their field, and can thus directly transfer their theoretical knowledge and practical experience to the various courses.

Course programmes are composed together with the customer, drawing from the set of basic and expertise course modules and completed with technical visits. The basic modules textbooks exist in Dutch, French and English. In addition, all course modules and visits can be lectured and guided in Dutch, French or English.

### ***- Research on trans-disciplinary aspects of education and training***

Understanding the benefits and risks of radioactivity requires technical insight and training, but also an understanding of the context and a sense for the social and philosophical aspects of the situation. In coordination with the academic sector, the research of isRP concentrates on how to integrate this trans-disciplinary approach in education and training programmes for professionals as well as students and pupils.

### **- Policy support with regard to applied education and training on a national and international level**

The implementation of a coherent approach to education and training in radiological protection becomes crucial in a world of dynamic markets and increasing worker mobility. Through networking and participation in international programmes, isRP aims to contribute to improved harmonisation of education, training practice and skills recognition on a national and international level.

## **2. Course programmes**

The course series *Background and Basic Knowledge* collects general and more specific technical courses on radiological protection. The series consists of seven modules and provides the theoretical and practical knowledge required for implementing technical aspects of radiological protection in a medical or industrial working environment, both in daily practice and in long term management:

- Basic principles of nuclear physics
- Interaction of radiation with matter
- Radiation and dose measurements
- Biological effects of ionising radiation
- Gamma spectrometry
- Standards and legislation
- ALARA and safety culture

Referring to questions such as – “*what is radioactivity?*”, “*how can we use it?*” and “*how can we protect ourselves against it?*”, the series starts with an introduction to nuclear physics that is then linked to a practice-oriented section on radiation dose measurements and spectrometry. The module on biological effects of ionising radiation presents an understanding of the effects of high and low level doses of ionising radiation on the human body. The series is completed with a state-of-the-art overview of standards and legislation and a rationale on ALARA and safety culture, including a demo session with virtual dose-assessment software tools.

When composing a custom-made programme, the course could start from this basic series, but some modules might be omitted and other more specialised modules could be added on request. More information on the content of the modules can be found on the isRP website [www.sckcen.be/isrp](http://www.sckcen.be/isrp).

The *nuclear and radiological expertise modules* are follow-up modules that fit in directly with the basic course series, although, provided there is sufficient foreknowledge, they may be taken separately. The series addresses technical practice-oriented issues with a link to radiological protection, and relies fully on the nuclear expertise of SCK•CEN. The series includes a.o.:

- Transport of radioactive materials
- Radon and increased natural radioactivity
- Ethical aspects of radiological risks
- Management of radioactive waste
- Management of routine discharges
- Internal dosimetry assessment from bioassay measurements
- Quality assurance and quality control related to nuclear safety
- Dismantling techniques
- Site remediation
- On-site accident management
- Use of personal protective equipment in the controlled area (practical training)
- Organisation of emergency planning
- Misuse of radioactive material: prevention and response
- Radiochemistry

Within the course programmes, lectures and practical training sessions can be alternated with visits to relevant laboratories and installations of the SCK•CEN. These technical visits enable participants to enrich and illustrate their acquired knowledge with the practice of 'real-life' situations, as much with regard to safety culture in controlled areas, as to the techniques and know-how of radioactivity applications as such. SCK•CEN installations and laboratories that can be visited include a.o.:

- BR1, the 'natural uranium – graphite – air' type research reactor;
- BR2, the high neutron flux material test reactor;
- BR3, the first prototype Pressurized Water Reactor in Europe, and the first now in dismantling phase;
- The HADES underground laboratory for waste disposal research and the EURIDICE demo hall;
- The radioactive decontamination wing of the medical services;
- The emergency planning and follow-up room;
- The "whole body" counter laboratory;
- The radiobiology and microbiology laboratories;
- The radioecology laboratories;
- The nuclear calibration services.

### **3. Research on trans-disciplinary aspects of education and training**

Understanding the benefits and risks of radioactivity requires technical insight and training, but also an insight into the context, as well as a sense for the social and philosophical aspects of the situation. In coordination with the academic sector, the research of isRP concentrates on how to integrate this trans-disciplinary approach within education and training programmes for professionals as well as students and pupils.

Pupils have a wide attention span and are eager to learn. In our complex society, they should be able to develop an open and critical mind in order to gain more insight in and confidence towards multi-aspect issues, such as the risks and benefits of radioactivity and nuclear technology, and their possible applications in the medical and energy sector. In this sense, isRP interacts with teachers of secondary schools in order to discuss how the standard education programme can integrate a pluralistic approach to complex technical issues, such as the applications of radioactivity. The aim is to identify gaps in the existing curriculum and to find out how to establish links between specific courses and how to organise 'cross-over' sessions in practice.

Towards the general public, isRP works together with Belgian industries' visitor centres as well as with regional and Belgian state-sponsored communication activities on physics and nuclear science. In cooperation with SCK•CEN-PISA (Program of Integration of Social Aspects into Nuclear Research), isRP has build up experience with the theory and practice of participation and involvement in technology assessment. On various occasions, the two groups organise round tables, workshops and focus groups with schools and local communities, and this on topics such as medical applications of radioactivity, (nuclear) energy policy and radioactive waste management.

### **4. Policy support with regard to applied education and training on a national and international level**

The spectrum of applications for ionising radiation is very wide, covering electricity production, medicine and several activities within the non-nuclear sector. Although working with a variety of responsibilities and towards specific professional aims, practitioners have a triple common need:

- basic education and training to provide the required level of understanding of artificial and natural radiation;
- a standard for the recognition of skills and experience;
- an opportunity to fine-tune and test acquired knowledge on a regular basis.

From an executive perspective, education and training are undoubtedly the two basic pillars of any policy regarding safety in the workplace. The radiological protection rationale that serves as the basis for this policy is the same all over the world, going beyond cultural differences and disciplinary applications. In this sense, the implementation of a coherent approach to education and training in radiological protection becomes crucial in a world of dynamic markets and increasing worker mobility. Through networking and participation in international programmes, isRP aims to contribute to an improved harmonisation of training practice and skills recognition on a national and international level. In this frame, specific issues of interest to isRP are: the standard requirements for course programmes and educational material; the development of trans-disciplinary training programmes; e-learning and

distance learning; the link between radiation safety and conventional safety; the organisation of experience feedback; international exchange of knowledge and experience, and the sharing of lecturers, training facilities and educational source material.

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