



SCK·CEN ACADEMY
FOR NUCLEAR SCIENCE AND TECHNOLOGY



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Welcome to the SCK•CEN Academy for Nuclear Science and Technology

Preserving and extending nuclear knowledge, skills and competences at the service of society is a key function of the Belgian Nuclear Research Centre SCK•CEN.

Extensive experience in nuclear science and technology, performing innovative research and the availability of large and unique nuclear facilities make our renowned nuclear research centre also an important partner for nuclear education and training, both in Belgium and at an international level. In order to support and optimise these activities and to facilitate interaction with the stakeholders we launched, in 2012, the SCK•CEN Academy for Nuclear Science and Technology.

In the interests of maintaining a competent workforce in industry, healthcare, research and policy, and of transferring nuclear knowledge to the next generations, the SCK•CEN Academy takes it as its mission to:

- provide guidance for young researchers;
- organise academic courses and customised training for professionals;
- offer policy support with regard to education and training matters;
- care for critical-intellectual capacities for society.

This brochure presents the projects and activities undertaken to fulfill this mission. We look forward to welcoming you at the SCK•CEN Academy.



Michèle Coeck
Head of the SCK•CEN Academy



Eric van Walle
Director-General of SCK•CEN



Guidance for young researchers

The SCK•CEN Academy provides opportunities for Bachelor and Master students, PhD candidates and any professional interested in enriching his or her nuclear competences. Post-doc positions are also available. Teaching and research supervision are provided by members of the SCK•CEN research team. They share their knowledge 'from the frontiers of nuclear science' and oversee practical exercises that can be carried out using our centre's nuclear facilities. Final-year pupils and teachers can also count on the SCK•CEN Academy.

Nuclear insights for pupils and teachers

Educational tours for final-year high school pupils make nuclear science a reality. They provide insights into its many applications in today's society, and a view on the daily practices in a research centre. On a monthly basis, final-year pupils and their teachers can participate in guided tours covering various nuclear themes such as research on radiation protection in space, the history and future of nuclear reactors, and the research concerned with finding solutions for the disposal of nuclear waste. The Academy also provides supporting educational material and organises workshops for teachers. These workshops discuss the state of the art of nuclear research and share insights on the what, why and how of teaching a complex subject such as nuclear science and technology in class.

Your thesis or internship through the SCK•CEN Academy

Supervising BSc and MSc students

Researchers at SCK•CEN are experienced in providing guidance in the preparation of theses for Bachelor and Master degrees. University students are given access to the research laboratories and the unique large-scale facilities of the centre, as well as to the expertise and insights of our researchers. We work closely with Belgian and international universities. This combination provides an exceptional learning opportunity. Our website has a list of possible thesis topics that is updated regularly. The details of the selection procedure can also be consulted via the website. SCK•CEN grants an annual award to the two best Master theses.



Opportunities for PhD students and post-doc researchers

SCK•CEN has supported PhD candidates and post-doc researchers since 1992. Post-docs are employed by SCK•CEN for a period of typically two years. PhD students are employed by the university but are based at the Academy in Mol to perform their research in SCK•CEN's laboratories. Presently, about 65 students from numerous countries prepare their thesis at the Belgian Nuclear Research Centre. They are offered the best of both worlds: they stay in close contact with the academic world and they enjoy a unique international research environment with advanced nuclear experimental facilities and top-level guidance from our experts. The success of our programme is demonstrated by the increasing number of applicants and selected students, and the high level of the publications and theses delivered. In 2015 we celebrated the 100th PhD diploma related to research performed at SCK•CEN.

PhD candidates and post-doc researchers are requested to submit a detailed application for review by the Academy and SCK•CEN's Scientific Council. Details on the available research topics and the selection procedure are posted on our website.

Internships and scientific visits

Outside the framework of a thesis, students as well as professionals are welcome for an internship or scientific visit. Applications can be submitted via our website or a customised visit can be requested via academy@sckcen.be.

- Guidance supporting internships and thesis work.
- SCK•CEN researchers share knowledge and experience.
- Access to research reactors and nuclear laboratories.





Organisation of courses on nuclear topics

Contributions to academic programmes

The SCK•CEN Academy contributes to academic learning through collaboration with all Belgian universities and several universities abroad.

BNEN, the Belgian Nuclear higher Education Network, provides a master-after-master specialisation in nuclear engineering, organised through a consortium of six Belgian universities and SCK•CEN. Teaching activities take place at our research centre in Mol. BNEN catalyses networking between academia, research centres, industry and other nuclear stakeholders, and aims at developing and maintaining high-level nuclear engineering competences. Courses are organised in English and in a modular way. Teaching blocks of one to three weeks for each module allow optimal time management for students and university lecturers, facilitate registration for individual modules, and allow easy access for international students.

The BNEN consortium was one of the very first in Europe to offer a nuclear engineering programme where nationwide expertise is gathered and combined with the infrastructure and access to operating reactors. It served as a role model for the foundation of ENEN, the European Nuclear Education Network.

The Radiation Protection Expert (RPE) course is a one-year post-graduate course developed in line with the legal requirements for RPEs, as set in the Belgian Royal Decree of 2001. It is targeted towards those who need to be formally recognised as RPE, as well as to all professionals working in nuclear, radiology or the medical sector. This course focuses on the scientific and technological basis of radiological and nuclear techniques, with specific attention to radiation protection. It is an initiative of SCK•CEN, Universiteit Hasselt, Institut Supérieur Industriel de Bruxelles (ISIB) and the Institut des Radioéléments (IRE), and is given in Dutch and French.

In addition to these two Belgian initiatives, the SCK•CEN Academy also contributes to numerous international courses. Among them are the European Master in Radiation Biology, the European Master in Radiation Protection, and several Erasmus Mundus exchange programmes.

Organisation of customised training courses for professionals

Relying on the expertise generated through SCK•CEN's R&D programme, the Academy offers a range of established and customised training courses aiming at improving knowledge and skills of professionals working with radioactive materials



or managing nuclear activities. These people work in the nuclear industry, the medical sector, research or governmental organisations, or deal with radioactive materials in the non-nuclear industry, in nuclear transport or during emergency situations.

Our course topics cover the areas of nuclear technology, nuclear materials, radiation protection, emergency management, decommissioning and decontamination, waste and disposal, radiation biology and -ecology, radiochemistry, and more.

The courses are offered in a modular way, allowing the programmes to be tailored in content, level, duration and language (English, French or Dutch). They are held at SCK•CEN's technical site in Mol, or at an alternative venue if preferred.

Technical visits supporting education and training courses

Within the course programmes, lectures and practical sessions can be complemented with visits to several nuclear laboratories and research reactors. These technical visits enable trainees to enrich and illustrate their acquired knowledge with the practice of real-life situations. SCK•CEN facilities that can be visited include: three operating research reactors (BR1, BR2 and VENUS), one research reactor in dismantling phase (BR3), hot cells, the HADES underground laboratory for waste disposal research, the decontamination wing of the medical services, the laboratories for antropogammametry and low-level alpha, beta and gamma measurements, the laboratories of the radiation biology, -ecology and microbiology groups, the dosimetry and nuclear

calibrations laboratory, and more.

The SCK•CEN lecturers

Among the SCK•CEN Academy lecturers - about 70 in total - are physicists, biologists, medical doctors, engineers, technicians 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 into the various courses. In addition, they possess excellent didactical skills. Many of our experts are also appointed as part-time professors or guest professors at several Belgian and international universities.

- A wide range of short- and long-term courses in all nuclear topics.
- Courses leading to academic and professional qualifications.
- Tailored training courses to match specific needs.
- Teaching by leading researchers.



Policy support

The spectrum of applications of ionising radiation is very wide. Although working with a variety of responsibilities and towards specific professional aims, practitioners all need education and training in support of continuous professional development to assure the required competences. From an executive perspective this is undoubtedly one of the basic pillars of any policy regarding safety in the workplace. The implementation of a coherent approach in this matter is crucial in a world of dynamic markets and increasing workers' mobility.

Through networking and participation in international programmes, the SCK•CEN Academy contributes to a better harmonisation of education, training and qualifications, ensuring a continuing availability of nuclear competences in academia, industry and regulatory authorities. In that context, we co-ordinated the series of the European Commission's framework projects ENETRAP, and are an active partner dealing with education and training matters in, for example, GENTLE, TRASNUSAFE, PETRUS III, ANNETTE, NUGENIA+, PREPARE and CONCERT. Furthermore, the Academy is represented in the IAEA Steering Committee for education and training in radiation protection and waste safety, and in many other technical and advisory group meetings such as those of EUTERP, EHRO-N, ENS/FORATOM and the OECD. Last but not least, the SCK•CEN Academy

takes the lead in the organisation of conferences and workshops dealing with education and training in nuclear science and technology, like the ETRAP conference series and our SCK•CEN Topical Days.

Our course programmes benefit directly from these international experiences as they can be aligned with the most recent international requirements.

- Active in international harmonisation of nuclear education and training.
- Participation in international projects and networks.
- SCK•CEN Academy courses are aligned with international requirements.





Caring for critical-intellectual capacities for society

Nuclear technology attracts attention and strong opinions in society. While the science itself may not be controversial, its application often is. Working with nuclear technology, either as scientist, manager or regulator, requires both technical knowledge and an insight in the societal issues. There is a growing awareness of the importance of being able to consider this wider context. The SCK•CEN Academy is unique in addressing this challenge by developing educational content and methods to raise awareness and stimulate thinking and discussion.

Training and discussion

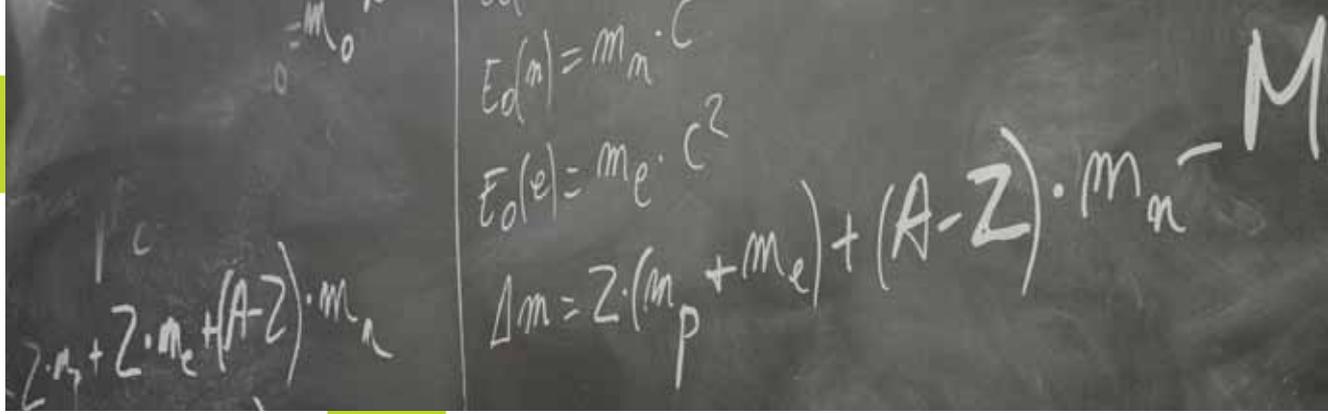
The philosophical and ethical dimensions of justifying and using nuclear technology are integrated in most courses offered by the SCK•CEN Academy. Two training modules address the topic directly. These are:

- Ethical aspects of radiological risk governance
- The science, politics and ethics of nuclear technology assessment

The SCK•CEN Academy also organises reflection groups to discuss the issues in a wider context than just the science. The aim of the training and discussions is to sharpen and stimulate the critical sense of participants with regard to the scientific, social, economic, political and ethical aspects

of evaluating nuclear technology applications. They do so by exploring and analysing historical and contemporary societal contexts, underlying philosophical ideas, and the meaning of the participants own rationalities, and those of others with regard to the issues at stake. These explorations are seen as mutual and interactive learning experiences, rather than as teacher-student practices, and they are undertaken in close collaboration with the Nuclear Science and Technology Studies group of SCK•CEN and with invited academics and representatives of civil society.

- Pioneering a unique critical-reflective approach.
- Creating awareness of the complexity of issues.
- Contextual and ethical reasoning as a relevant skill.



Quality assurance



The quality of the teaching and of the courses taught is a top priority for the SCK•CEN Academy.

SCK•CEN Academy teachers and supervisors are top-level scientists and technicians with a broad experience in the topics they tutor. In addition to their required scientific and technical expertise attention is also given to their competences as teachers. All of them have participated in a 'Learning Facilitator' training course to enhance their didactical and training skills and to improve the effectiveness of their training courses.

The SCK•CEN Academy obtained the Qfor quality certification for training institutes. This third-party quality endorsement is based on a client satisfaction survey and an analysis of the organisational processes and resources of SCK•CEN and its Academy.



The SCK•CEN Academy in a nutshell – facts and figures –

- The SCK•CEN Academy was launched in 2012, bringing all existing education, training and student support activities of the Belgian Nuclear Research Centre into one structure.
- The knowledge shared by the SCK•CEN Academy is based on more than 60 years of experience in nuclear science and technology, and is delivered by top-level researchers, engineers and technicians.
- Technical visits to large and unique nuclear facilities and practical exercises complement the theoretical education and training activities.
- We have launched more than 200 PhD projects of which more than 100 in the past 6 years. In 2015 the 100th PhD diploma was obtained.
- The SCK•CEN Academy currently guides about 65 PhD students, and annually about 50 Bachelor and Master thesis.
- The Academy offers internships and opportunities for scientific visitors.
- Final-year high school pupils and their teachers, as well as university students, can book guided tours to SCK•CEN's facilities.
- Collaboration with universities leads to the organisation of academic courses at the SCK•CEN Academy in Mol.
- Customised training courses for professionals dealing with ionising radiation are available in the research domains of SCK•CEN: nuclear technology, nuclear materials issues, radiation protection, emergency management, decommissioning, waste and disposal, radiation biology and -ecology, and more.
- Since 2012, the SCK•CEN Academy provided training to over 1000 professionals and students.
- Participants in our courses and PhD programme come from over 30 different countries.
- In 2015 we signed a practical arrangement with IAEA for cooperation in education and training of students and nuclear professionals.
- The SCK•CEN Academy contributes to international policy support programmes related to education and training, allowing most recent international standards and practices to be directly implemented in our learning activities.
- The SCK•CEN Academy is unique in addressing a societal context next to the technical and scientific aspects of nuclear applications by developing educational content and methods to raise awareness and stimulate thinking and discussion.
- The SCK•CEN Academy and research centre are located on an extensive campus in wooded surroundings. The campus offers a range of accommodation options, from dormitories to apartments, and access to on-site restaurant and leisure facilities.

[SCK•CEN – Belgian Nuclear Research Centre](#)

SCK•CEN is a foundation of public utility, with a legal status according to private law, that operates under the tutorship of the Belgian State Secretary in charge of Energy.

[Laboratories](#)

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