



Radiation in space

SCK•CEN plays an important role in the pioneering research to enable space exploration and future long duration human space travel, for example to the Moon or Mars.

Our scientists investigate, together with a large consortium of international experts, solutions for the challenges of space travel, including the exposure to cosmic radiation.

The findings of this research are translated into courses for students and professionals dealing with space applications.

Theoretical lectures are complemented by a number of practical session in the biology, dosimetry and material analysis laboratories. Visits to related facilities are also introduced.

Themes

Space weather and cosmic radiation

The daily dose of ionising radiation in space is much higher than on earth, and has a severe impact on the human body and the living environment in space. This module describes the characteristics of the indoor and outdoor space radiation environment, including space weather, and the challenges this brings for space exploration.

Radiation dosimetry

This part deals with units, doses, dose responses, LET, and RBE in radiation monitoring and radiation protection. It informs about measurement and simulation techniques used to characterize ionizing radiation in space, both inside and outside the space vehicles. It discusses the measurement systems suitable to be used under space conditions and the optimal shielding applications.

Impact on health

Space travel has a severe impact on the human body. In this module the effects of radiation, as well as other stress factors such as weightlessness and long-term confinement, on the human body are discussed. Both cancer as well as non-cancer effects are treated.

Impact on habitat and life support

Assuring a healthy environment in the spacecraft is essential, even while continuously exposed to radiation. Also the safe supply of oxygen, water and food, and efficient waste removal, in the remote confined space habitat is a challenge. This section enlightens the current international biotechnological developments addressing these needs.

Effects on hardware and instrumentation

Radiation does not only affect the living material, it also has an effect on supplies, instruments and materials used in space. This module provides an insight in the relevant material sciences with applications in space.

Visit us at academy.sckcen.be for more information



Technical visits

- Radiobiology and microbiology laboratories
- Dosimetry and nuclear calibrations laboratories
- Animal facility
- Anthropogammametry laboratory
- Alpha, beta and gamma spectroscopy laboratory
- Radioactive decontamination wing of the medical services

Methodology

All courses are tailored to the needs of the target public:

- The programme touches upon one or more of the themes described above;
- It is complemented by practical exercises and visits to relevant facilities;
- The total duration is variable;
- The level is adapted to the target audience;
- Courses are given in English, French or Dutch;
- Courses are given preferably at SCK•CEN's premises in Mol (Belgium) because of the availability of the specialized laboratories, and possibilities for hands-on exercises. Alternatively, if only theoretical classes are involved, courses can also be given at the customer's premises.

Lecturers

Courses are given by top-level SCK•CEN scientists with solid expertise in their research domain. Furthermore, they have followed learning facilitator training sessions and can thus transfer their theoretical knowledge and practical experience to the course participants efficiently and effectively.

Target audience

Our education and training courses on space-related issues are targeted towards a broad audience such as pupils and their teachers, university students and professionals dealing with space applications.

Space school

We help teachers and students who wish to develop a space project or experiment, and we welcome BSc, MSc and PhD students for their thesis project or internship in our laboratories. We organize also a two-week space summer school treating in detail the themes mentioned above, focusing on the scientific fundamentals and technical applications.

Customized courses for professionals

Customized courses for professionals can be set up at any point in time, treating the specific topics of interest.