

Field: RADIATION PROTECTION

Topic: USE OF RADIOANALYTICAL EQUIPMENT AND METHODS FOR REGULATORY ACTIVITIES

Course type: TRAINING

Date: 11-15 December 2023

Duration: One week

Location: Rio de Janeiro, Brazil

Working language of the course: English

Objective and learning outcomes

This course offers technical knowledge of dosimetry and radioanalytical measurement procedures and equipment applied for personal dose measurements and environmental radioactivity control so that the trainees can improve their competences and skills in review, assessment and inspection to confirm compliance with regulatory requirements (dose limits, dose constraints, release limits and/or reference levels).

Outline of course content

- Introduction to **radiation protection** principles, interpretation of the international regulations on radiation protection (with particular emphasis on UNSCEAR, ICRP, IAEA documentation).
- Fundamentals of
 - **gamma spectrometry** for the non-destructive and isotope selective determination of radionuclides,
 - **alpha spectrometry (AS)** for the destructive and isotope selective determination of radionuclides, including the aspects of sample destruction, radiochemical separation and alpha source preparation,
 - **beta spectrometry (BS)** i.e. liquid scintillation counting (LSC) for the destructive and semi-selective determination of radionuclides, including the aspects of sample destruction, radiochemical separation and LS source preparation).
- **Case studies:**
 - I:** Application of gamma spectrometry for the measurement of environmental radioactivity (energy, shape and efficiency calibration, correction for absorption, self-attenuation and coincidence, calculation of activity concentration and measurement uncertainty, use of PC codes),
 - II:** Application of alpha spectrometry for the measurement of uranium isotopes (^{238}U , ^{235}U , ^{234}U) in a soil sample (energy and efficiency calibration, use of radioactive ^{232}U tracer, soil destruction, separation of uranium with extraction chromatography, alpha source preparation, calculation of activity concentration and measurement uncertainty),
 - III:** Application of LSC for the measurement of environmental radioactivity in water (efficiency-quench calibration, chemical separation, calculation of activity concentration and measurement uncertainty).
- Introduction of governmental and regulatory functions and processes in relation to nuclear facilities (nuclear power plants, research reactors, mining and ore processing plants, waste management facilities, medical facilities etc.), and environmental radioactivity measurements performed in monitoring.
- Technical visit and hands-on demonstration on the infrastructure and operation of an environmental monitoring laboratory.

Technical schedule and delivery methods

The course will last a working week (i.e. 5 workdays).

- **Classroom lectures** will be held in relation to four modules on radiation protection, alpha, beta and gamma spectrometry with the introduction of case studies. These lectures – 90 minutes each and time allocated for discussions and appropriate breaks – will take 4 days. Presentations on local and regional specificities will take half a day.
- **Technical visit and hands-on demonstration** will take half day.

Target audience

This course is intended to experts and professionals of Nuclear Regulatory Authorities (NRAs) and Technical Support Organisations (TSOs), preferably with responsibilities and experience related to radiation protection, radioanalytics and environmental monitoring.

Target number of participants: 15 – 25

Prerequisites and requirements for participants

Participants should have an adequate level of knowledge in English (at least an ‘Independent user’ level defined by the [CEFR](#)) and basic radiation protection knowledge. A university degree obtained in engineering, physics or chemistry faculties with nuclear specialization OR at least 2 years of professional experience in functions relevant to the content of the course is also a prerequisite.

Relevancy of the course topic in the work and institutionally justified interest in participating will be considered as well as the need and opportunity for filling competence gaps. Regional connections to the course location are prioritized and efforts are made to ensure gender equality, so these aspects may also be taken into account as selection criteria.

Terms of participation

The project is implemented under the European Union (EU) external assistance programme called the European Instrument for International Nuclear Safety Cooperation (INSC) and aims to support the National Nuclear Regulatory Authorities (NRAs), their Technical Support Organisations (TSOs) and Environmental Radioactivity Monitoring Laboratories in non-EU countries in strengthening their capabilities with regard to their regulatory tasks and responsibilities in the field of nuclear safety and radiation protection.

Employees of the NRAs or their TSOs in the Beneficiary Countries are eligible for financially supported participation in the T&T courses. Beneficiary Countries of the project are published on the project website <https://training.ek-cer.hu/>.

Costs

Travel costs and subsistence allowances (including the international and national travel tickets, per diems, shuttle services, insurance and visa costs) for participants will be covered by the project.

Application

Application via the project website <https://training.ek-cer.hu/>, according to the process and deadlines indicated there.

Examination

Technical and linguistic tests will be written as part of the application and selection process to assess the underlying knowledge and preparedness of applicants. Knowledge and development of selected participants will be assessed through technical tests throughout the course.

Participants attending the full course will be issued with attendance certificates. Successful participants will receive certificates confirming their knowledge achieved and skills acquired.