

Field: NUCLEAR SAFETY

Topic: DETERMINISTIC SAFETY ASSESSMENT

Course type	TUTORING	Objective and learning outcomes This course provides the tutee with theoretical background on the safety assessments, with particular focus on nuclear technology aspects important to beyond design basis (severe accident) analysis, as well as practical skills through the familiarization with a severe accident computer code and the associated safety analysis method. The course thus enables tutees to improve their technical discipline competences in related fields.
Host institute	Nuclear Safety Research Institute (NUBIKI) Budapest, Hungary	
Date	6 November – 1 December 2023	
Duration	Four weeks	
Working language	English	

Outline of course content

- Introduction of EU and international (e.g. IAEA) standards and Hungarian nuclear regulations for the analysis of beyond design basis severe accidents, as well as the use of the analysis results to support severe accident management and Level 2 Probabilistic Safety Assessment (Level 2 PSA).
- Familiarization with the features and capabilities of computer codes for the analysis of severe accidents, including ASTEC, MAAP, MELCOR, and with dedicated applications of these codes.
- Overview of principles of compiling the input database of severe accident analysis codes.
- A more detailed introduction of the fully integrated, engineering-level computer code MELCOR developed by Sandia National Laboratory (US).
- Introduction and explanation of methods of using the results of the deterministic severe accident analysis.
- On-the-job training on severe accident analysis:
 - creation of input models,
 - calculation(s) and presentation of results,
 - interpretation and evaluation of results,
 - use of the results for
 - evaluation of severe accident management strategies,
 - supporting Level 2 PSA,
 - determining of environmental releases (source term) to underpin emergency preparedness.

Technical schedule and delivery methods

The course will take 4 working weeks (i.e. 4 × 5 workdays).

One working week will deal with the introduction to the general methods of severe accident analysis:

- **Classroom lectures and facilitated discussions** will take 5 days with 2 units per a day (tentatively in morning sessions with 2 lectures/discussion periods of 90 minutes each, with time allocated for appropriate breaks).
- **On the job training** on the use of severe accident analysis codes will take 5 days (tentatively in afternoon sessions).

Three working weeks will be related to performing analysis of a severe accident sequence of a VVER type nuclear power plant by the MELCOR computer program:

- **Classroom lectures and facilitated discussions** will take 10 days with 1 unit per a day (tentatively morning sessions with 1 lecture/discussion period of 90 minutes).
- **On the job training** on performing deterministic calculations by the MELCOR code and presenting and using the analysis results will take 15 days (tentatively in afternoon sessions).
- 1 one-day **technical visit** to the Paks Nuclear Power Plant.

Target audience

This course is intended to experts and professionals of Nuclear Regulatory Authorities (NRAs) and Technical Support Organisations (TSOs) with responsibilities in the field of nuclear safety.

Target number of participants: 2

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](#)). A university degree with nuclear specialization and 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. Efforts are made to ensure gender equality.

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) and their Technical Support Organisations (TSOs) 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 website <https://training.ek-cer.hu/>.

Costs

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

Application

Application via the 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.

Work reports will be prepared to allow for progress monitoring and determining the final development through acquisition of knowledge, practical experience and expertise, as well as task completions.

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