

Field: NUCLEAR SAFETY

Topic: INSPECTION OF I&C (INSTRUMENTATION AND CONTROL), SAFETY SYSTEMS AND STRUCTURE

Course type:	TRAINING	Objective This course provides technical knowledge about the main principles of nuclear safety in relation to I&C systems of nuclear power plants, as well as the key elements of safety classification of I&C functions, systems and equipment, and the architectures and design principles for defence in depth and diversity. Participants will have a basic understanding of safety standards governing the processes of I&C system design, licensing, operation and inspection so that they can improve their competences and skills in carrying out related regulatory functions.
Date:	25-29 March 2024	
Duration:	One week	
Location:	Budapest, Hungary	
Working language of the course:	English	

Outline of course content

The course will provide trainees with essential information on the following topics through theoretical lectures and a series of discussion sessions to share experiences and practices:

- Definition of instrumentation and control (I&C) systems and functions in nuclear power plants (NPPs)
- Main principles of nuclear safety in relation to I&C
- Role of I&C systems in safe plant operation
- Key physical components of I&C interfacing with the process
- Safety classification of I&C functions, systems and equipment
- Role of I&C in plant monitoring, testing, signal validation and fault detection
- Influence of safety standards on I&C system design, licensing, operation and inspection
- Architectures of I&C system supporting defence in depth
- Design principles of digital I&C systems
- Multi-layered defence in depth and diversity in I&C systems
- Addressing and preventing common-cause failures
- Various forms of diversity applied in I&C development
- Overview of lifecycle stages of I&C systems
- Available international documents supporting I&C development
- Introduction to field-programmable gate array (FPGA) digital technology and its applications in NPPs
- Applications of analogue and digital I&C platforms in NPPs
- Standards and qualification procedures for I&C equipment
- International outlook of nuclear power and its I&C systems

Technical schedule and delivery methods

The course consists of one module taking a working week (i.e. 5 workdays).

- **Classroom lectures** will take 4 days with 4 lecture units per day (tentatively morning sessions with 2 lecture units of 90 minutes each and afternoon sessions with 2 lecture units of 90 minutes each, with time allocated for discussions and appropriate breaks).
- **Group projects** will be included involving tasks and discussions throughout the week. The results and findings will be summarised in presentations by each group on the last day of the course.

Target audience

This course is intended for experts and professionals of Nuclear Regulatory Authorities (NRAs) and Technical Support Organizations (TSOs), preferably with responsibilities and experience related to I&C systems of nuclear installations.

Applicants from countries considering or already developing nuclear power programs, as well as expanding their existing operating power programs, are encouraged to apply for the course.

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](#)). A university degree and at least 3 years of professional experience in functions relevant to the content of the course is also a prerequisite. Qualifications obtained in engineering or physics faculties with nuclear specialization would be an asset.

The 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 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 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.
