NUCLEAR TECHNOLOGY EDUCATION CONSORTIUM

N13 CRITICALITY SAFETY MANAGEMENT

Summary

The N13 module provides a comprehensive introduction to nuclear criticality safety and the management of nuclear criticality safety in facilities, or situations, where fissile materials are encountered outside a nuclear reactor. This module, which reflects the core competencies specified by the United Kingdom Working Party on Criticality (WPC), consists of a basic nuclear reactor physics and fuel cycle pre-course reading component (mandatory for students who have not yet completed the N01 module) and a one-week taught component which includes a presentation from a visiting lecturer from industry/ government, and an introduction to the use of Monte-Carlo codes for criticality safety analysis. The taught component is followed by a challenging post-course criticality safety assessment that is designed to consolidate knowledge gained during the course and to enable students to join industry with a solid understanding of the criticality safety process. This post-course assignment comprises 100% of the module assessment.

Syllabus & Assessment

Upon completion of this module students should have a thorough grounding in the following topics:

- Physics of nuclear criticality
- Methods of criticality control
- Criticality incidents and accidents
- Regulatory requirements and standards
- Criticality safety assessment methodology
- Criticality hazards in fuel manufacture, reprocessing and decommissioning
- Criticality hazards in storage and transport
- Estimating sub-criticality
- Criticality codes, uncertainty and validation
- Computer modelling for criticality safety
- Criticality incident detection and response

and be able to:

- Perform a comprehensive criticality safety assessment of an operational or (hypothetical) planned facility or plant, or part therein, involved in the use, storage, or processing of fissile materials

which will require them to:

- Apply the appropriate regulatory legislation, guidance, or standards during this assessment
- Apply the range of techniques taught during the course (i.e. handbook curves & tables, analytical (hand) calculations, & computational methods) to assess the critical state, or the degree of sub-criticality, of facility or plant
- Justify their analysis through the appropriate use of data, benchmarks, cross-comparison of methods, and/or sensitivity analysis