NUCLEAR TECHNOLOGY EDUCATION CONSORTIUM

N11 RADIATION SHIELDING

Summary

This module gives an introduction to radiation shielding merging practical problems with industry standard transport codes in order to give a good understanding of the requirements for radiation shielding.

The aims of this module are:

To introduce the subject of radiation shielding and illustrate solutions to the particle transport equation in the context of Monte Carlo and deterministic transport codes. Simple shielding methods will be compared with sophisticated complex calculations in order to familiarise students with the essential concepts. As well as the core material, the course has four external lecturers who are experts in their respective fields. The use of Monte Carlo and Deterministic Codes will be presented in the context of industry needs and requirements. Shielding applications and the shielding design process will be discussed.

On completion of this module, students should be able to:

- Demonstrate an understanding of the Particle Transport equation and the transport codes and methodologies used to solve it.
- Understand and be able to evaluate a shielding scenario using simple shielding methods.
- Demonstrate an understanding of the Monte Carlo and Deterministic methods and they are applied to radiation shielding calculations.
- Understand the systematic process that must be followed in order to design shielding to adequately protect those working with ionising radiation.
- Have an understanding of how the range of shielding solutions is consistent with common principles of radiation physics and radiological protection.

Syllabus

This module, which will be delivered at the University of Liverpool, will include lectures on the following topics:

- The Particle Transport Equation
- Radiological protection principles
- Simple shielding methods
- Monte Carlo and Deterministic codes
- Advanced shielding methods
- The design process
- Real examples

The module will have nine lectures, four of which will be presented by key experts from respective parts of the nuclear shielding community. The module has a practical component which allows experimental validation of the initial Monte Carlo simulation codes for neutron and gamma radiation fields. The post course assignment extends the simulation work to look at more advanced problems.