

# NUCLEAR TECHNOLOGY EDUCATION CONSORTIUM

**N12**

## **REACTOR THERMAL HYDRAULICS**

### **Summary**

This module describes the thermal hydraulic processes involved in the transfer of power from the core to secondary systems of nuclear power plants. Fundamental calculations associated with these processes will be explained, examples set and results discussed.

On completion, students should have obtained:

- An understanding of the heat transfer mechanisms in reactor systems.
- An understanding of fluid flow mechanisms in reactor systems.
- An appreciation of the limits on safe power removal from reactor cores.
- An appreciation of computer codes used to assess limiting power.
- An understanding of the influence of power conversion methods on reactor design.
- The ability to perform basic calculations of thermal hydraulic quantities in core channels.

### **Syllabus**

This module consists of a taught part (lectures) and an applied part. The taught part comprises:

- Introduction to Reactor Thermal Hydraulics.
- Heat transfer in fuel elements.
- Heat transfer by convection.
- Boiling heat transfer.
- Hydraulics of reactor system loops.
- Hydraulics of heated channels.
- Critical flows.
- Thermal hydraulic design.
- Steam and gas power cycles.

For the second half of the module the student will be working on an assignment. This will be to produce calculations for the limiting thermal hydraulic quantities in the hot channel of a hypothetical reactor core. Results from an industry standard computer code (COBRA-EN, TRACPFQ) will be provided for comparison and comment.