

CERTIFICATE of COMPLETION

This is to certify that

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has successfully completed

**Nuclear Fuel Engineering, Fabrication and Operation Behaviour
E-learning course**

**Module 1: General fuel overview, design, fuel fabrication,
surveillance, and qualification process**

September 19, 2025

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Subtopics

Learning Objectives

Nuclear Fuel overview

To develop an understanding of nuclear fuel, including heat production in nuclear fuels, what nuclear fuels can be made of, fuel functions and fuel choices, existing reactors and fuel types, resources, and requirement

Nuclear Fuel Description

To become familiar with nuclear fuel main parts and components, and its functional requirements, and principal interfaces associated to nuclear fuel assemblies, reactor vessel, storage pools, shipping casks

Nuclear Fuel Fabrication

To become familiar with nuclear fuel manufacturing steps from raw material to fuel assemblies

Thermal-mechanical and irradiation behaviour of fuel rods

To become familiar with the behaviour of the pressurised water reactor fuel rods, and the main phenomena occurring during the fuel use in a reactor and in case of accidents, including heat production and deposit, temperature profile; geometric changes, cladding evolution; fuel pellet evolution, fission gas behaviour, restructuring; accidental conditions

Fuel qualification aspects

To become familiar with fuel qualification aspects, codes, and methodologies to assess fuel performance, including IAEA Specific Safety Guide No SSG-52 “Design of the Reactor Core for Nuclear Power Plants”; stages of Fuel Design Cycle; fuel qualification process and codes and methodologies to assess fuel performance during operation and abnormal operational occurrences.

Fuel surveillance

To become familiar with fuel surveillance at nuclear power plants focusing on fuel reliability and leaker monitoring, including consequences of fuel failure in a nuclear power plant, activity release from defective fuel rods; root causes of fuel failure and countermeasures; identification of defective fuel rods