

## Course on

# Core modelling for transients

**The course** deals with the modelling of nuclear reactors in transient conditions, focusing on the modelling of neutron transport, heat transfer, fluid dynamics, fuel thermo-mechanics, and their interdependencies.

The **pedagogical format** of the course is based on a **hybrid flipped classroom**. In this format, you need to complete some **online self-paced preparatory work** (representing about 40 hours of work) before attending **interactive classes** organized during 5 consecutive days (representing about 40 hours of work). Those classes are given in a hybrid set-up, with participants following the classes either onsite or remotely on the web. Research in engineering education demonstrated that flipping leads to higher student engagement, better achievement of the learning outcomes and increases the interactions between the students and the teachers.

**After successfully completed the course, you will be able to:**

- Understand the principles of deterministic methods in non-steady-state conditions and of macroscopic modelling of nuclear thermal-hydraulics and fuel thermo-mechanics.
- Know the involved approximations and their range of validity.
- Apply various numerical techniques to solve linear and non-linear large system of equations, with special focus on multi-physics modelling.
- Implement such methods in modelling environments.
- Use coupled simulation software.
- Understand the outputs of such software.

The **target audience** for the course is:

- MSc students, PhD students and Post-Doc students having some background knowledge in nuclear engineering.
- Nuclear engineers.
- Reactor physicists.
- Nuclear safety analysts.
- Research scientists in the above fields.

In order to **pass the course** and be issued a **course completion certificate**, you need to obtain at least 50 points (out of 100 max. points). All activities (both

during the preparatory work and the interactive classes) are graded. The certificate will briefly describe the course contents, the number of hours the different course elements represent and the number of equivalent ECTS credits (European Credit Transfer and Accumulation System). **The course is worth 3 ECTS.**

**As a course participant, you get access to:**

- An online **Learning Management System** with 24/7 access to all teaching resources for 4 months.
- During the **online self-paced preparatory phase**:
  - A set of **handbooks** written for the course.
  - **Video lectures** associated to the handbooks.
  - **Quizzes** to test your understanding.
- During the **interactive phase**:
  - **Engaging activities** aimed at applying the principles learned during the preparatory phase.
  - **Expert support** from the teachers.
  - Possibility to **network** with the other participants.

You can read some **testimonies** of our past attendees on our website at this [link](#).

**The course is given by:**

- Prof. Rafa Miró, Universitat Politècnica de València, Valencia, Spain.
- Prof. Sandra Dulla, Politecnico di Torino, Turin, Italy.
- Prof. Christophe Demazière, Chalmers University of Technology, Gothenburg, Sweden.
- Assoc. Prof. Diana Cuervo, Universidad Politécnica de Madrid, Madrid, Spain.
- Assoc. Prof. Carsten Lange, Technical University of Dresden, Dresden, Germany.
- Dr. Alessandro Scolari, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland.

**The course is fee-based.** Fees vary according to geographical location (developed or emerging country) and participant status (student or professional). Payment of the course will be requested after having applied and having received confirmation that you have been accepted for the course. People accepted for the course will then get a link to pay online. The course fees are as follows:

- Course fee for professionals – Developed countries: 1875 EUR (VAT included).

- Course fee for professionals – Emerging countries: 300 EUR (VAT included).
- Course fee students – Developed countries: 100 EUR (VAT included).
- Course fee students – Emerging countries: 50 EUR (VAT included).

You can find more information on fees and the list of developed and emerging countries on our website at this [link](#).

The course platform opens on December 12<sup>th</sup>, 2025, for the online self-paced preparatory work, and the interactive sessions are organized between January 12<sup>th</sup> and January 16<sup>th</sup>, 2026, at Chalmers University of Technology, Gothenburg, Sweden, and on the web.

**Apply for the course between October 13<sup>th</sup>, 2025, and November 2<sup>nd</sup>, 2025:**

**[great-pioneer.eu/registration](https://great-pioneer.eu/registration)**

Participants choosing the onsite version of the course must also cover their own expenses (travel, food, and accommodation). Possibilities to apply for financial support for onsite attendance are indicated in the application form above.

Questions can be sent to [contact@great-pioneer.eu](mailto:contact@great-pioneer.eu)