Third International School on Simulation of Nuclear Reactor Systems (SINUS) with a focus on light water reactors, including SMRs

When?

**5 May 2025 - 2 July 2025**

Online training & in-person event on 30 June - 2 July 2025 at Cambridge University, UK

Contact

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[Register for the event](https://www.oecd-nea.org/confdb/confdb/confform?id=1046)

Overview

The NEA will organise the third [International School on Simulation of Nuclear Reactor Systems (SINUS)](https://www.oecd-nea.org/jcms/pl_88778/international-school-on-simulation-of-nuclear-reactor-systems-sinus) on the topic of*Reactor single- and multi-physics simulations based on Light Water Reactor (LWR) Uncertainty Analysis in Modeling (UAM) benchmark with a focus on light-water small modular reactors (LW-SMRs).* Targeting students and young professionals in the nuclear sector, the course brings together the next generation of experts with the expert community from the NEA [Working Party on Scientific Issues and Uncertainty Analysis of Reactor Systems (WPRS)](https://www.oecd-nea.org/jcms/c_12832/working-party-on-scientific-issues-and-uncertainty-analysis-of-reactor-systems-wprs%22%20%5Co%20%22Working%20Party%20on%20Scientific%20Issues%20and%20Uncertainty%20Analysis%20of%20Reactor%20Systems%20%28WPRS%29).

The event will be jointly developed by the North Carolina State University (NCSU), the Radiation Safety Information Computational Center (RSICC) at Oak Ridge National Laboratory, and the NEA WPRS with support of the Commissariat à l'énergie atomique et aux énergies alternatives (CEA). The in-person part will be co-located with the [WPRS Benchmarks Workshops 2025](https://www.oecd-nea.org/jcms/pl_98752/wprs-benchmarks-workshops-2025)  hosted by the University of Cambridge in Cambridge, United Kingdom.

The technical content of the training sessions will be based on the [LWR UAM benchmark](https://www.oecd-nea.org/jcms/pl_32175/benchmark-for-uncertainty-analysis-in-best-estimate-modelling-for-design-operation-and-safety-analysis-of-light-water-reactors-lwr-uam). It follows the specifications of the benchmark for selected benchmark exercises from the three phases of the benchmark and includes additional exercises based on an LWR-SMR academic concept ([PRATIC core](https://www.epj-n.org/articles/epjn/pdf/2024/01/epjn20240027.pdf)). The scope includes quantifying and propagating relevant significant uncertainties through different single physics and multi-physics modeling and simulation of nuclear reactor cores using the Pressurised Water Reactor test cases.

The trainings include practical exercises with state-of-the-art reactor simulation packages, which are provided by the NEA Data Bank and RSICC.

The course features lectures by NCSU faculty members with support of CEA, as well as internationally renowned experts from the WPRS and its expert groups. The SINUS training sessions takes place in a hybrid format.

SINUS provides an opportunity to develop a multinational network with fellow participants and international experts, and to learn more about this challenging and innovative subject.

Course content and timeline

The SINUS consists of remote and in-person trainings.

5 May - 30 May 2025: Remote training

The remote training includes approximately 40 hours of remote lectures and exercise sessions. The practical exercises are based on examples taken from the Benchmark for LWR-UAM of WPRS and on the PRATIC SMR academic concept, and focus on quantifying and propagating relevant significant uncertainties through different single physics and multi-physics modelling and simulation of nuclear reactor cores using the PWR test cases. The course features homework assignments and computer projects for participant teams to be completed and presented during the in-person sessions.

Five virtual training sessions:

* Session 1: Multi-scale reactor physics
* Session 2: Fuel modelling
* Session 3: Time-dependent neutronics
* Session 4: Bundle thermal-hydraulics
* Session 5: Core multi-physics

June 2025

Participants receive project assigments in which they practice the application of reactor simulation packages. Results of the project work are presented during the in-person meeting in Cambridge, United Kingdom.

30 June - 2 July 2025: In-person training

The NEA organises the in-person training of the International School on Simulation of Nuclear Reactor Systems (SINUS) on 30 June - 2 July 2025. The in-person part is co-located with the [WPRS Benchmarks Workshops 2025](https://www.oecd-nea.org/jcms/pl_98752/wprs-benchmarks-workshops-2025) hosted by the University of Cambridge in Cambridge, United Kingdom.

Participation

The course is free of charge and open to advanced Master’s and PhD students, or young professionals with a Master’s or PhD degrees in nuclear engineering, reactor physics, nuclear physics, and related disciplines. Requirements:

* Basic knowledge of radiation transport and reactor physics;
* Basic knowledge of numerical mathematics, statistics, and scientific computing;
* First practical experience with numerical simulation software.

Participants are selected based on eligibility and excellence, considering geographical, and gender balance aspects. The selection process is based on an applicant's motivation letter and their educational track records.

The proposed committee for selecting the students includes high-level experts in the field of reactor physics: the Chair of WPRS, the Chairs of the NEA Expert Group on Reactor Multiphysics (EGMUP), and the Head of the NEA Division for Nuclear Science and Education. The selection process is supported by the NEA Secretariat.

Organisation

Training material development is co-ordinated by the [NCSU](https://www.ncsu.edu/) with support from the [CEA](http://www.cea.fr/). THe [RSICC](https://www.ornl.gov/onramp/rsicc) and the NEA Data Bank support the distribution of the required software.  The University of Cambridge will host the in-person event in Cambridge, United Kingdom.

Training material is distributed on a [MyNEA SharePoint Page](https://mynea.oecd-nea.org/sites/WPRS/education/sinus2025) (access only for lecturers and participants).

Registration

Application deadline: **9 March 2025**  [Register for SINUS 2025](https://www.oecd-nea.org/confdb/confdb/confform?id=1046)