Fourth International School on Simulation of Nuclear Reactor Systems (SINUS)

Register for the event

Overview

The NEA will organise the fourth 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).

The course is being 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 2026 hosted by Nuclear Operations & Facilities and the Department of Engineering Physics at McMaster University, and located in Hamilton, ON, Canada and supported by the Safety Licensing Program of Conexus Nuclear Inc. (formerly CANDU Owners Group), on behalf of its four Canadian domestic funding members (*Bruce Power (BP), Canadian Nuclear Laboratories (CNL), New Brunswick Power (NBP),* and *Ontario Power Generation (OPG)*), and three international funding members (*Societatea Nationala Nuclearelectrica S.A. (SNN)*, Romania, *Korea Hydro and Nuclear Power Company (KHNP),* Korea, and *CNNP Nuclear Power Operations Management Company Ltd. (CNNO)*, China).

The technical content of the training sessions will be based on the LWR UAM benchmark. 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). 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 SINUS training sessions takes place in a hybrid format, featuring lectures by NCSU faculty members, as well as internationally renowned experts from the WPRS and its expert groups.

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

Course content and timeline

The SINUS consists of remote and in-person trainings.

11 March - 17 April 2026: Remote training

The remote training includes approximately 40 hours of remote lectures and exercise sessions : maximum 1 or 2 hours/day between 3pm and 6pm (CET/CEST).

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

20 April - 8 May 2026

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 Hamilton, ON, Canada.

11 May - 14 May 2026: In-person training

The NEA organises the in-person training of the International School on Simulation of Nuclear Reactor Systems (SINUS) on 11 May - 14 May 2025. The in-person part is co-located with the WPRS Benchmarks Workshops 2026 hosted by McMaster University, in Hamilton, ON, Canada

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.

Participants are to make sure they can complete the 40 hours of remote lectures, the project assignment and the in-person training at Hamilton, ON, Canada during the WPRS Benchmarks Workshops.

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 with support from the CEA. The RSICC and the NEA Data Bank support the distribution of the required softwares. McMaster University will host the in-person event in Hamilton, ON, Canada.

Training material will distributed through MyNEA SharePoint area.

Technical Programme Chairs

- Prof. Maria N. AVRAMOVA North Carolina State University (NCSU), UNITED STATES

- Prof. Kostadin IVANOV, North Carolina State University (NCSU), UNITED STATES
- Dr Claire VAGLIO-GAUDARD, Commissariat à l'énergie atomique et aux énergies alternatives (CEA), FRANCE
- Dr Barbara VEZZONI, Commissariat à l'énergie atomique et aux énergies alternatives (CEA), FRANCE

Trainee Selection Panel

- Prof. Kostadin IVANOV, North Carolina State University (NCSU), UNITED STATES & Chair of WPRS
- Dr Tatiana IVANOVA, NEA, Head of Division of Nuclear Science & Education
- Dr Timothy E. VALENTINE, Radiation Safety Information Computational Center (RSICC), UNITED STATES & Chair of EGMUP

Registration

The application period is open until 23 January 2026.

Please register here: Register

Selected participants will be announced on 6 February 2026.

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McMaster University, University Hall Tower and Archway. Photo credit: Matthew Ingram, Uploaded: 12 May 2007, CC BY 2.0.

When?

11 March 2026 - 14 May 2026

Online training & in-person event on 11-14 May 2026 at McMaster University, Hamilton, ON, Canada

Contact

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Tags

Education Nuclear science Nuclear science Reactor physics SINUS Training WPRS