

Development and Implementation of educational courses on Strategic Planning for Sustainable Nuclear Energy

Joint initiative by educational networks within the IAEA framework

Information Sheet

Background

Energy is critical for all social and economic activities and plays a central role in sustainable development. The key challenge for sustainable energy development is to address the interactions among the four dimensions: economic, environment, social, and institutional, in a balanced way, and making relevant trade-offs. Nuclear energy has the potential to make a significant contribution to sustainable energy.

The International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) has developed a model curriculum for a master's degree course¹ covering topics related to the strategic planning for sustainable nuclear energy development. The curriculum can be used by developers of university curriculum as well as faculty and instructors from academic and other educational institutions, including centres of excellence and vocational education, that are implementing or considering educational programmes on the long-term planning for sustainable nuclear energy development.

The rationale for developing a master's level model curriculum on nuclear energy strategic planning using the IAEA INPRO methods and approaches is to prepare graduates from university programmes to gain an awareness and understanding of the INPRO methodology and capabilities. This will allow countries and organizations to make the best-informed decisions on the future use of nuclear energy systems. The introduction of the courses based on the model curriculum in the educational process will contribute to the expansion and deepening of knowledge about the long-term sustainability aspects of nuclear energy systems. It is essential that information on INPRO activities be delivered to young professionals, lecturers and students at technical universities and other relevant educational organizations, who will further be engaged in development and deployment of sustainable solutions for nuclear systems in the IAEA Member States.

The model curriculum along with associated educational modules can be incorporated into academic programmes. It is generally anticipated that the curriculum will be used as part of master's programmes in nuclear engineering and other fields associated with strategic planning for sustainable nuclear energy development. The curriculum is sufficiently broad that it can be also of interest to students in disciplines such as engineering, physics, energy economics, planning and policy.

The proposed curriculum can be used by universities in several ways. This can be adapted as a single course, however, the material in the model curriculum is very comprehensive and, therefore, can be utilized for several courses. As an additional alternative, universities could utilize this model curriculum as a basis to create an entire master's programme. The decision on how to proceed with the model curriculum and the associated material is up to implementing university. The IAEA can support interested universities to determine how best to implement the model curriculum in their educational programme.

¹ MODEL CURRICULUM ON STRATEGIC PLANNING FOR SUSTAINABLE NUCLEAR ENERGY, IAEA NUCLEAR ENERGY SERIES No. XXXXX, 2023, in print (Draft is attached to this document)

Objectives of educational courses based on the IAEA/INPRO Module Curriculum

The courses² that can be based on the suggested modules have several objectives. These include:

- Provide an update on the status of electricity generation in the world; with emphasis on pros and cons of all possible energy sources including nuclear energy as well as renewables.
- Provide an independent overview of the status and future developments in the nuclear energy industry around the world, including existing and advanced power-reactors, including small modular reactors (SMR) designs, and Generation-IV reactor concepts, and other advanced concepts.
- Deliver a description of the evaluation capabilities of the INPRO approaches and tools for application to nuclear energy systems based on different types of nuclear power plants and their fuel cycles.

Purpose of the joint initiative

This initiative is within a framework of collaboration between Regional and National Networks in nuclear education, training, related research, and outreach according to the 2023-2024 Common Action Plan.

Purpose of the suggested joint initiative is to support universities in developing and implementing the educational courses based on the IAEA/INPRO Module Curriculum, in particular:

- finalization of educational programmes based on the suggested modules (as suggested in the IAEA/INPRO publication),
- development of training materials,
- train-trainers – upskilling the university teachers on subject,
- share experience in implementation of the courses on Strategic Planning for Sustainable Nuclear Energy.

Requirements for participating universities

Universities and/or other educational institutions that have decided to develop and implement educational courses based on the IAEA/INPRO Module Curriculum can become participants of the initiative.

It is necessary that the universities before the end of 2023 confirm their intention by sending a letter to Mr. Gladyshev (position, mail)) and appoint a responsible person who will represent the university in this initiative.

Suggested implementation steps in 2023-2024

- Hold webinar on the project for interested universities (STAR-NET jointly with IAEA/INPRO and IAEA/NKM) – November-December 2023.
- Create the Project team (February 2024).
- Hold virtual meetings with Project team – finalization of project team, requirements, expectations etc. (February -March 2024).

² The suggested educational modules provide a basis for different master's degree courses (some courses can be taken by PhD students) for different students depending on their main area of study and learning objectives defined by a particular university.

- Hold kick-off meeting to develop the road map (joint IAEA/INPRO and IAEA/NKM meeting) – 2024.

To participate in the first webinar, during which the IAEA/INPRO Module Curriculum and the joint initiative will be presented and discussed, it is necessary by 15 November 2023 to send the contact details of the prospective participants to STAR-NET representative Mr Andrei Kosilov (2015starnet@gmail.com). They will be sent an invitation and a link to connect.