

## **Reactor Simulator and Digital Control Room to Create New Paradigms for Nuclear Engineering Education and Research**

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**Program:** General Scientific Infrastructure

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### **ABSTRACT:**

To enhance the educational and research missions of the Department of Nuclear, Plasma, and Radiological Engineering (NPPE), as well as the research mission of DOE-NE, this project aims to acquire a nuclear reactor simulator and a versatile, configurable, and extensible digital control room. This simulator and digital control room will be used in undergraduate and graduate course work, in K-12 outreach efforts, and for research in several areas of importance to DOE-NE, including a recently awarded DOE/NEUP research project titled, “*Probabilistic Validation and Risk Importance Ranking Methodology for Automation Trustworthiness and Transparency in Nuclear Power Plants*”, and another ongoing NEUP project titled, “*Evaluation of micro-reactor requirements and performance in an existing well-characterized micro-grid*”. These projects have industry and national laboratory partners.

*The simulator will be used to support our teaching mission and be integrated into courses in NPPE. The introduction of the simulator in these courses will give our students a better understanding of nuclear engineering principles and significantly more enhanced, hands-on, and practical experience with reactor operations and maintenance. In the absence of a physical research or training reactor, a modern nuclear reactor simulator will provide our students with the reactor operational experience that should be an essential part of any nuclear engineering degree. For PRA education, the simulator will provide students with hands-on experience to collect and analyze human performance data as input to PRA and Human Reliability Analysis (HRA).*