

# Nuclear Engineering Seminar

## Dr. Stylianos Chatzidakis,

*Assistant Professor, Purdue University*

**Wednesday, November 13, 2024**  
**3:30 pm | MATH 175**

AI/ML in Nuclear Systems: Feasibility, Methodology, and Insights for Cyber Event Characterization

### Abstract

There is increased interest from the nuclear industry and nuclear engineering community to explore the applicability of AI/ML in the nuclear domain. A successful implementation of AI/ML in the nuclear realm could provide tangible benefits to stakeholders. For example, AI/ML could enhance the detection of operational anomalies, predict system failures before they occur, and optimize maintenance schedules, thereby reducing the risk of accidents and ensuring adherence to strict safety standards. In this presentation, we will discuss and summarize the methodology, implementation, performance evaluation, and lessons learned of an experimental and computational effort to assess the feasibility of AI/ML technologies to characterize cyber events in a nuclear system and to test the main hypothesis of a recent research project: “AI/ML can be feasibly and usefully applied to characterize system states resulting from cyber events.”



#### Education

Ph.D., Nuclear Engineering, Purdue University

M.Sc., Energy Physics, Grenoble Institute of Technology, France

Dipl. Eng., Mechanical Engineering, National Technical University of Athens, Greece

#### Research Interests

Computational radiation imaging and cosmic ray muon tomography

Embedded sensors and nuclear sensing

Aerosol jet printing and functional metamaterials

Quantum key distribution

Instrumentation and control

Spent nuclear fuel storage, transportation, and disposal

Scientific machine learning, convolutional neural networks, Bayesian learning theory

#### Affiliations

American Nuclear Society (ANS), American Physical Society (APS), American Society of Mechanical Engineers (ASME), Institute of Electrical and Electronics Engineers (IEEE), Institute of Nuclear Materials Management (INMM), Sigma Xi Honor Society, Alpha Nu Sigma Honor Society