

Nuclear Power Generation Graduate Certificate

Ira A. Fulton School of Engineering

asuEngineeringOnline.com

Overview

The Nuclear Power Generation (NPG) graduate certificate is a multidisciplinary professional option within the Ira A. Fulton School of Engineering. Courses from multiple academic units constitute both the core and elective classes available to the student. All of the core classes and many of the NPG elective courses will be offered online through the Engineering Office of Global Outreach and Extended Education (GOEE). The graduate-level certificate program requires 18 hours of coursework with a minimum of two-thirds at the 500-level or higher.

Students typically begin with the study of nuclear science and engineering fundamentals. Subsequent courses focus on reactor theory, power plant dynamics, structural materials, and operational safety. Elective course(s) allow students to tailor the remaining studies toward facilitating their career goals and focusing on studies tied to their discipline.

For more information visit:

asuEngineeringOnline.com/NPG

or contact:

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Core and Elective Courses

Core Courses

EEE 562 Nuclear Reactor Theory and Design
EEE 563 Nuclear Reactor System Dynamics and Diagnostics
EEE 564 Interdisciplinary Nuclear Power Operations
MSE 565 Structural Materials in Nuclear Power Systems

Elective Courses

EEE 460/591 Nuclear Power Engineering
EEE 463/591 Electrical Power Plants
EEE 498/591 Health Physics
EEE 598 Radiation Effects on Electronics
IEE 547 Human Factors Engineering
SOS 534 / CEE 598 / MAE 598 Sustainable Energy and Material Use
MSE 540 Fracture, Fatigue, and Creep

Course Descriptions

EEE 460/591 Nuclear Power Engineering

Radioactivity and decay. Radiation interactions and dose. Nuclear reaction, fission and fusion theory. Fission reactors, four factor formula, moderation. Nuclear power, TMI, Chernobyl. Nuclear fuel cycle.

EEE 562 Nuclear Reactor Theory and Design

Principles of neutron chain reacting systems. Neutron diffusion and moderation. One, two and multi group diffusion equation solution methods. Heterogeneous reactors. Nuclear fuel steady-state performance. Core thermal-hydraulics. Core thermal design.

EEE 563 Nuclear Reactor System Dynamics and Diagnostics

Time dependent solution to neutron diffusion equation. Reactor kinetics and reactivity changes. Dynamics, stability and control of reactor systems. Modeling neutronic and thermal processes. System characterization in time and frequency domains. Reactor surveillance and diagnostics.

EEE 564 Interdisciplinary Nuclear Power Operations

Nuclear power plant systems. Study of the interrelationship and propagation of effects that systems and design changes have on one another, especially in relation to nuclear power plant safety and operations. Case studies and design projects.

MSE 565 Structural Materials in Nuclear Power Systems

An overview of reactor systems and discusses the structural materials used in reactor components (e.g., Fuel/core, wall/blanket, heat exchanger, and steam turbine materials). Design considerations, and materials degradation processes that occur in service are discussed. The effect of radiation damage on materials properties is emphasized. Reactor systems including fission- (e.g., PWR, LWR, BWR, LMFBR) and fusion-based reactors are reviewed.

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