ARIZONA STATE UNIVERSITY

Graduate Certificate in Nuclear Power Generation

The *Nuclear Power Generation* (NPG) graduate certificate is a multidisciplinary professional option within the Ira A. Fulton Schools 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 are offered online through the Engineering Office of Global Outreach and Extended Education (GOEE). The graduate-level certificate program requires 15 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.

The core courses are

- EEE 562 Nuclear Reactor Theory and Design (3)
- EEE 563 Nuclear Reactor System Dynamics and Diagnostics (3)
- EEE 564 Interdisciplinary Nuclear Power Operations (3)
- MSE 565 Structural Materials in Nuclear Power Systems (3)

The elective courses are

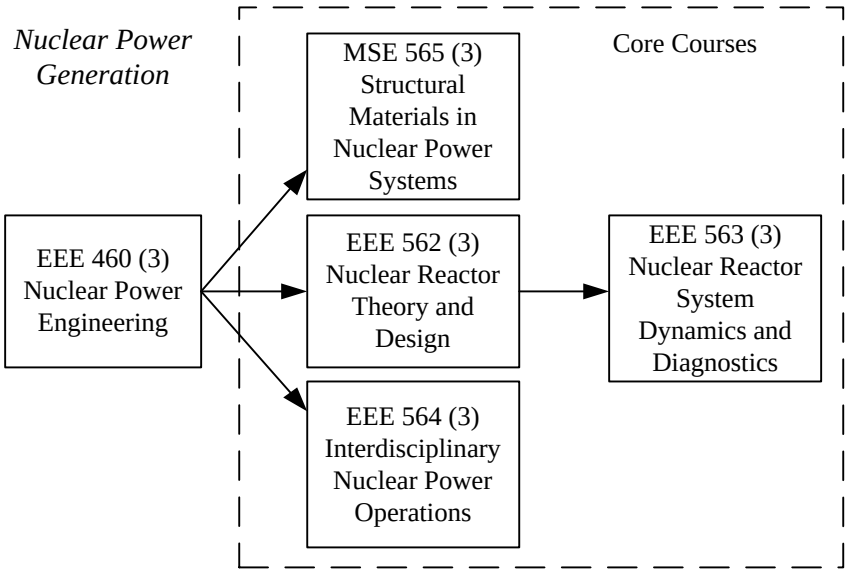
- EEE 460/591 Nuclear Power Engineering (3) **
- EEE 463/591 Electrical Power Plants (3)
- EEE 498 Health Physics (3)
- EEE 598 Radiation Effects on Electronics (3)
- IEE 547 Human Factors Engineering (3)
- SOS 534 / CEE 598 / MAE 598 Sustainable Energy and Material Use (3)
- MSE 540 Fracture, Fatigue, and Creep (3)

*** EEE 460 is a pre-requisite to the core courses; for those students who have not successfully completed such a course, EEE 460/591 may be taken as an elective prior to enrolling in the core courses and applied toward the 15 hrs required for the graduate certificate.*

Students must enroll in at least 6 credit hours in a calendar year. The certificate program must be completed within five calendar years. All courses which will count for the certificate must have a cumulative GPA of 3.00 or higher, and each course used to earn the certificate must be completed with a grade of 'C' or higher.

Admission: Applicants who hold a bachelor's degree in an engineering or science discipline, such as physics, chemistry and mathematics, from a regionally accredited institution are eligible to apply to the program. Applicants are required to submit an official ASU graduate online application, official transcripts of all undergraduate and graduate coursework, and a statement of career and educational goals. Regular admission may be granted to applicants who have achieved a grade point average of 3.0 (4.0 scale) or better in the last two years of work leading to a bachelor's degree and are competitive in the applicant pool. The application for graduate admission may be completed online at http://graduate.asu.edu/admissions/ .

Course	ASU Course Catalog Description	Next Offering
EEE 591 (460) 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.	Summer 2016: EEE 591: 44360
EEE 591 (498) Health Physics Principles	Sources, characteristics, dosimetry, shielding and measurement techniques for cosmogenic, terrestrial and anthropogenic radiation. Ionizing and non-ionizing radiation theory. Philosophy of radiation protection. Instrumentation, detectors and environmental monitoring.	Summer 2017?
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.	Fall 2016: EEE 562: 84870 (on-campus) EEE 562: 87729 (online)
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.	Spring 2017
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.	Summer 2016: EEE 564: 42195
MSE 565 Structural Materials in Nuclear Power Systems	This course provides 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.	Fall 2017?



Plan of Study Road Map: If desired, the NPG certificate coursework can be completed in one calendar year by either a full-time or part-time student. Example schedules to accomplish this are outlined below:

Plan for students who have previously completed an introductory nuclear engineering course such as EEE 460	Plan for students who have **not** previously completed an introductory nuclear engineering course such as EEE 460
Fall: EEE 562 and MSE 565 Spring: EEE 563 and EEE 564 Summer: elective course	Summer: EEE 460 Fall: EEE 562 and MSE 565 Spring: EEE 563 and EEE 564

Program Delivery Mode: The primary mode of instructional delivery will be online through the Office of Global Outreach and Extended Education (GOEE) (formerly the Center for Professional Development, CPD); see http://www.asuengineeringonline.com/ .

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