**Course Topics**

**EEE 562: NUCLEAR REACTOR THEORY AND DESIGN**

**Course Description:** 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.

**Prerequisite:** EEE 460

**Course Topics:**

I. Neutron Diffusion

II. Reactor Theory

III. Reactor Design

Neutron Interactions; Cross-sections; Flux

Scattering Energy Loss; Fission

Neutron Flux; Fick’s Law

Neutron Continuity Equation; Diffusion Equation; Boundary Conditions

Diffusion Equation Solutions; Diffusion Length

Thermal Neutron Diffusion

Two-Group Neutron Diffusion

Multigroup Neutron Diffusion

One-Group Reactor Equation; Slab Reactor

Three-Dimensional Reactor Shapes

One-Group Critical Equation

Thermal Reactors

Reflected Reactors

Heterogeneous Reactors

Multigroup Calculations

Nuclear Plant

Reactor Heat

Fuel Rod Heat Conduction

Single-Phase Fuel Channel Heat

Boiling Heat Transfer

Reactor Thermal Design

PWR vs. BWR: Nonflow vs. Flow System Quantities

Hydrodynamic Core Analysis

Nuclear Power Plant and Reactor Core Design Procedures