**Course Topics**

**EEE 563 NUCLEAR REACTOR SYSTEM DYNAMICS AND DIAGNOSTICS**

**Prerequisite**: EEE 562

**Course Description**: 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.

**Course Topics:**

* Introduction; Reactor kinetics without delayed neutrons
* Delayed neutrons; Reactor kinetics parameters
* Point kinetics with delayed neutrons
* Point kinetics step response
* Prompt jump approximation; Point kinetics perturbation form
* Zero power reactor transfer function
* Inhour equation; Multiple delay groups
* Subcritical reactor kinetics; Circulating fuel reactor kinetics
* Reactivity control
* Fuel temperature reactivity feedback
* Moderator reactivity feedback
* Reactor core modeling
* Fission product poisons
* Fuel depletion
* NSSS dynamics and modeling
* Distributed system representation
* Instrumentation
* Reactor system control
* Online monitoring
* Surveillance and diagnostic methods
* Instrumentation diagnostics
* Moderator temperature coefficient of reactivity
* BWR core stability
* Reactor protection system
* Complete homework assignment