

## Advanced Power System Stability and Transient Studies

Code	CreditHours
EEE-802	3-0

### CourseDescription

This postgraduate course delves into the advanced concepts and techniques related to power system stability and transient analysis. It covers both theoretical and practical aspects of stability analysis, including small-signal stability, transient stability, and dynamic performance of power systems. Students will explore methods for analyzing system responses to disturbances, implementing control strategies, and mitigating stability issues. The course integrates theoretical knowledge with practical applications, including case studies and simulation exercises, to prepare students for addressing complex stability and transient challenges in modern power systems.

### Textbook

Power System Stability and Control by Prabha Kundur, 1st Edition, 1994  
Publisher: McGraw-Hill

### ReferenceBook

Power System Dynamics: Stability and Control by K. R. Padiyar, 2nd Edition, 2016,  
Publisher: I.K. International Publishing House

### Prerequisites

- 1 Power system analysis
2. Control System

### ASSESSMENTSYSTEMFORTHEORY

Quizzes	10-15%
Assignments	5-10%
MidTerms	25-30%
Project	5-10%
ESE	45-50%

## TeachingPlan

Week No	Topics	LearningOutcomes
1	Introduction to Power System Stability	Overview of power system stability, significance of stability in maintaining reliable power systems. Identify the factors affecting power system stability.
2-6	Mathematical Models of Power Systems, Small-Signal Stability Analysis,	Develop mathematical models for synchronous machines, transformers, and transmission lines.Utilize state-space models for power system analysis.Understand the role of different models in stability studies.Explain the concept of small-signal stability and its importance.Apply eigenvalue analysis to assess system stability.Use linearization techniques to analyse small-signal stability
7-8	Transient Stability Analysis, Voltage and Frequency Stability Analysis	Understanding of transient stability and understand its implications.Perform time-domain simulations to analyse system responses.Evaluate transient stability using appropriate techniques.Describe voltage stability and its indicators.Identify the causes and consequences of voltage collapse.Apply methods to assess and improve voltage stability.Understand the principles of frequency stability and dynamics.Analyze frequency control mechanisms and their effectiveness.Assess the impact of disturbances on system frequency and stability.
9	<b>MIDTERMEXAM</b>	
10-12	Control Strategies for Stability Improvement,	Detailed overview of power system control strategies: PSS, FACTS, and HVDC. Design and implement control systems for stability enhancement.Evaluate the performance of different control strategies.
13-17	Power System Transients and Fault Analysis, Simulation Tools for Stability Analysis	Analyze power system transients and fault behaviours. Apply techniques for fault detection and isolation.Assess the impact of faults on overall system stability.Familiarize with simulation tools used for stability analysis.Develop models and set up simulations for stability studies.Interpret and analyse simulation results for stability assessment.
18	<b>FINALEXAM</b>	