

Course 501

## **Analysis and Mitigation of Power System Oscillations**

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### **Course Objectives**

This course covers the theory behind power system oscillations, practical experiences, methods of analysis, and techniques for preventing potentially dangerous oscillations in power systems. The subject will be of interest to those working in system planning or operations who wish to learn about this critical aspect of power system security. After completing the course, students will be able to understand what are power system oscillations, how they can be analyzed, and the methods to enhance damping of such oscillations.

### **Course Delivery**

The course will be delivered in classroom presentations, aided by computer software for studies of power system oscillations. The presentation slides will be handed out to the students as the course notes.

### **Instructor**

To be determined.

### **Recommended Prerequisites**

Courses 101 & 102 – Power System Fundamentals I & II.

### **Course Outline**

- Introduction
  - Definition and classification of power system stability •
  - Conceptual relationship among power system reliability, security, and stability
  - Challenges to secure operation of power systems in the new industry environment
  - Focus of the course
- Overview of small signal stability
  - Description of small signal stability problems
  - Objectives of small signal stability analysis
- Utility experience and practice related to small signal stability
  - Incidents of low frequency oscillations
  - Historical review and current status of PSS and other applications
  - Examples of utility experiences
  - Comments on importance of carrying out small signal stability analysis
- Model development and verification
  - Performance requirements of key equipment
  - Load models
  - Performance verification by simulations
  - Model validation by field testing
- Analysis methods
  - Time-domain simulations

- Modal analysis
- Measurement based methods
- Complementary use of different analysis methods
  
- Study objectives, approaches, and procedure
  - An synopsis of a typical small signal stability study
  - Local modes of oscillations
  - Inter-area modes of oscillations
  - Control modes
  - Torsional modes
  
- Power system stabilizer design and tuning
  - Review of PSS
  - Design and tuning procedure including application of WECC PSS design criteria
  - Performance verification
  - Case studies
  
- Illustrative examples and case studies

Note that the actual contents of this course offered on specific dates may be customized from the above. Please check with Powertech for details.