

Course 201

## **Power System Dynamics**

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### **Course Objectives**

This course covers various aspects of power system dynamics. Students will learn the basics of dynamic characteristics of power system equipment, dynamic performance of power systems, stability, and controls. After completing the course, the students will be able to understand fundamental dynamic behavior and controls of power systems and to perform basic stability analysis.

### **Course Delivery**

The course will be delivered in classroom presentations, aided by computer software for various types of dynamic analyses. The presentation slides will be handed out to the students as the course notes.

Note that this course may be delivered in 2 to 4 days, depending on the contents to be included. Please check with Powertech on topics to be included for the course offered on specific dates.

### **Instructor**

To be determined.

### **Recommended Prerequisites**

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

### **Course Outline**

#### Session 1

- Introduction to power system dynamics
- Power system equipment dynamics
  - Synchronous generator
  - Excitation system
  - Turbine and speed governing system
  - Loads
  - Other equipment
  - Performance requirements
- Introduction to power system stability
- Transient stability
  - Basic concepts
  - Modeling requirements
  - Simulation of power system dynamic responses
  - Protective relay performance
  - Case studies

Session 2

- Small signal stability
  - Basic concepts
  - Modeling requirements
  - Method of analysis – time-domain simulation
  - Method of analysis - modal analysis
  - Case studies
  
- Voltage stability (dynamic perspective)
  - Basic concepts
  - Modeling requirements
  - Simulation of mid- and long-term power system dynamics
  - Complementary use of static and dynamic methods in voltage stability analysis
  - Case studies
  
- Frequency stability
  - Basic concepts
  - Modeling requirements
  - Methods of analysis
  - Case studies

Session 3

- Power system controls - I
  - Transient stability enhancement
  
- Power system controls - II
  - Power system stabilizers
  
- Power system controls - III
  - Tie line control
  - AGC

Session 4

- Defense plans against extreme contingencies
  - Special protection systems (SPS)
  
- Dynamic security assessment of power systems
  - Security criteria
  - Methods of analysis
  - Determination of stability limits
  - On-line applications

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