



Electrical Engineering

Electrical Utility Communications, Applications & Smart Grid Technologies

Course Introduction

The modernization of the Electric Power Grid, often called "Smart Grid" by its proponents, is an important goal. Efforts such as the Advanced Metering Infrastructure (AMI), Automated Meter Reading (AMR) and the other phases of intelligent grid management are all part of the smart grid. Having better control of the power grid will improve its Reliability and Efficiency and, as applications are developed for end users, point-of-use monitoring and control of power usage will benefit utilities by reducing peak loads and benefit consumers.

In grid-automation applications, the control system forms the core of the design with the communications media being a secondary consideration that can be implemented in a number of ways. Each Technology has advantages and disadvantages and each is "best" for some circumstances. Because of the complex layout of the Power Grid and the various equipment connected to it.

Many of the Techniques used to send information to and from the Power Grid have been shown to avoid widespread Interference Problems. If an Electric Utility is implementing Grid Automation, this does not necessarily mean that there will be interference. If a utility uses a technology that does not cause interference, or if operating a BPL system runs it at the correct power levels with notching in the Amateur bands, grid automation hardware can operate without widespread interference problems. BPL can and does play a role in grid automation, especially for the in-premise part of these systems. Other media will also be used.

Target Audience

- Electrical Design Engineer
- Electrical Engineer
- Electrical Project Engineer

Learning Objectives

- Understanding of the emerging Smart Grid “Intelligent Power System”.
- Also it will review all aspects of the Smart Grid including definition, major components, important features and practical examples of this new technology.
- Instructor of the course led demonstrations will be performed by the Instructor following Selected Sections (where applicable).

Course Outline

- **DAY 01**

- Module (01) Introduction**

- 1.1 Defining a Smart Grid
 - 1.2 Characteristics of a Smart Grid
 - 1.3 Value of a Smart Grid
 - 1.4 The Economic Case
 - 1.5 The Environmental Case
 - 1.6 Benefits to Utilities
 - 1.7 Benefits to Consumers

Module (02) The “SMART” Power Grid

- 2.1 Power System Overview
- 2.2 Power System Components
- 2.3 Key Infrastructure Issues
- 2.4 Power System Protection – Traditional vs ‘Smart’
- 2.5 Network Blackout – An example

• Day 02

Module (03) Consideration of Smart Grid

- 3.1 Challenges and Opportunities
- 3.2 Regulatory Challenges
- 3.3 Utility Business Model
- 3.4 Consumer Impacts
- 3.5 Cost of a Smart Grid
- 3.6 Government Smart Grid Stimulus

Module (04) Power Generation

- 4.1 Generation Fundamentals
- 4.2 Traditional Generation
- 4.3 Distributed Generation
- 4.4 Micro-Grid Generation
- 4.5 Generator Protection

• Day 03

Module (05) Power Grid Interconnection

- 5.1 Transmission Lines
- 5.2 Grid Interconnection – Systems
- 5.3 Grid Interconnection – DGT
- 5.4 Transmission Line Protection
- 5.5 Wide Area Protection
- 5.6 Communication Networks
- 5.7 Line Current Differential protection
- 5.8 Instructor led Lab Exercises

Module (06) Smart Power Consumers

- 6.1 Saving Power/Saving Money
- 6.2 Smart Meters

- 6.3 Off Peak Demand
- 6.4 Load Shedding
- 6.5 Alternate/Green Energy Systems

• **Day 04**

Module (07) Power Distribution System

- 7.1 Distribution Systems
- 7.2 Smart Substation
- 7.3 Feeders
- 7.4 Transformers
- 7.5 Micro-Grids
- 7.6 Smart Grid Key Points
- 7.7 Commercial / Residential

Module (08) Communication Key to Smart Grid

- 8.1 Wide Area Networks
- 8.2 Information to/from Substations
- 8.3 Wireless Networks
- 8.4 Distribution Automation
- 8.5 AMI Networks

• **Day 05**

Module (09) Network Security

- 9.1 Potential Threats
- 9.2 Government Regulations
- 9.3 Network Protection
- 9.4 IEC 61850 Considerations

Module (10) Smart Grid Monitoring & Control

- 10.1 Utility Monitoring & Control
- 10.2 Inter-System Coordination
- 10.3 Industrial Systems
- 10.4 Consumer/Residential
- 10.5 Brining it All Together
- 10.6 Working with The Government

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
June 23, 2025	June 27, 2025	5 days	4250.00 \$	UAE - Abu Dhabi
Sept. 1, 2025	Sept. 5, 2025	5 days	4250.00 \$	UAE - Abu Dhabi
Dec. 22, 2025	Dec. 26, 2025	5 days	4250.00 \$	UAE - Dubai
Sept. 7, 2025	Sept. 11, 2025	5 days	4250.00 \$	Oman - Muscat

