BOOST
THE LEADING TRAINING PROVIDER

Electrical Engineering

Electrical Load and Energy Forecasting, Planning & Demand Side Management

Course Introduction

This course will assist power system professionals in planning and operating a power system with increasing penetration of Demand Side Management (DSM) Programs renewable resources. Renewable generation impacts both the planning and the operating criteria. These criteria are examined in detail along with the new requirements for generation reserve margins. Distributed generation and smart meter infrastructures are discussed in light of commercial and residential programs. Weather volatility impacts the demand profile. Weather normal methodologies are presented along with short and long terms forecasting models. Demand Side Management programs are a fine balancing act between demand, supply and customer choice (and incentives).

The Power of Agile Virtual Devices.

The course presents various facets of demand side management and the broader smart grid roadmaps for customers. The Internet of Things/ The Internet of Everything is a game changer through the Power of Agile Virtual Devices. The course presents how new Devices bring new Analytics and innovative approaches to Demand Side Management.

Target Audience

- Electrical Controls Engineer
- Electrical Design Engineer
- Electrical Engineer
- Electrical Project Engineer

Learning Objectives

- Set Power System Planning Objectives

- Gain knowledge about Load Forecasting Methodologies
- Identify Factors affecting Load Forecasting
- Have a good understanding of different kinds of Short Term and Long Term Planning
- Examine the principle of Energy supply & demand forecasting with a National and Regional perspectives
- Assess the market conditions that effect power and energy generation, transmission and distribution
- Understand the critical role of energy demand forecasting in the market.
- Utilize the various methodologies and technologies to meet the challenges of energy demand forecasting

Course Outline

- **DAY 01**

Module (01) Bulk Electricity System

  - 1.1 Generation System
  - 1.2 Transmission System
  - 1.3 North American Electricity Reliability Council (NERC) STANDARDS and REQUIREMENTS

Module (02) Energy Markets

  - 2.1 Real Time Market
  - 2.2 Day Ahead Market
  - 2.3 Bilateral Contracts
  - 2.3.1 Terms and Structures of Renewable Contracts
  - 2.3.2 FIT in Tariffs in Canada
  - 2.4 Physical versus Financial Transactions
  - 2.4.1 Generator Offers into Market
  - 2.4.2 Dispatchable Loads

- **Day 02**

Module (03) Load Forecasting Methodology

- 3.1 3Weather Forecasts
- 3.2 Simulation, Optimization, Sensitivity Analysis
- 3.3 Forecasting Methodologies and statistical techniques, Neural-Net modeling, End-Use modeling, Metrix ND & LT)
- 3.4 Weather Normalization and Probability Distribution Tools

Module (04) Load Demand Patterns

- 4.1 Short Term Load Forecasting Models: Operating Time Frame
- 4.2 Long Term Load Forecasting Models: Planning Time Frame
- 4.3 Weather Normal load forecasting

• **Day 03**

Module (05) Volumetric Risk

- 5.1 Weather Response
- 5.2 Weather Derivatives
- 5.3 How can data be used for decision making?
- 5.4 What data will be needed in future?
- 5.5 What data should be collected (and analyzed) now?

Module (06) Long Term Planning

- 6.1 Reliability Criteria
- 6.2 Generation Reserve Margin
- 6.3 Loss of Load Probability
- 6.4 Loss of Load Expectation
- 6.5 Variable generation and their impact on the LOLP, LOLE
- 6.6 Capacity Planning
- 6.6.1 Renewable Generation
- 6.6.2 Demand Management
- 6.6.3 Case Study

• **Day 04**

Module (07) Short Term Planning

- 7.1 Day Ahead
- 7.2 Real Time
- 7.3 Secure Islanding of Power Plants
- 7.4 Operating Reserves in a System With Renewable Generation

Module (08) System Controls for Power Quality for Demand

- 8.1 Power Electronics
- 8.1.1 Static VAR Compensators
- 8.1.2 Voltage and VAR Control
- 8.1.3 Smart Inverters

• **Day 05**

Module (09) Demand Side Management and the Physical System

- 9.1 Load Frequency Control
- 9.2 Load Pricing Control & Load Shedding

Module (10) Demand Side Management

- 10.1 Energy Asset Programs: Integrate technical and financial elements under a single contract agreement
- 10.2 Utility Service Agreement
- 10.3 Customer Benefits
- 10.4 Data Management and Analytics for Utilities
- 10.5 Big Data: How can Data be used for Decision Making?
- 10.6 Dispatchable Loads

• **Day 06**

Module (11) Characteristics of Wind and Solar Power Generation

- 11.1 Short Term variability of a Photovoltaic Plant
- 11.2 Commercial

- 11.3 Residential
- 11.4 Impact of Renewables on the Demand Side Management Programs
- 11.5 Adjustment Energy Cost

Module (12) Energy Storage

- 12.1 State of the art in energy storage
- 12.2 Fly Wheels
- 12.3 Type of Storage
- 12.4 Electrical Vehicles
- 12.5 Impact on Demand Side Management Programs

- **Day 07**

Module (13) Smart Meter Infrastructure

- 13.1 Smart Meters: its evolution
- 13.2 Smart Meters: the new generation
- 13.3 Metering Infrastructure Standards
- 13.4 Advanced Metering Infrastructure (AMI)

Module (14) Smart Meter Ecosystem

- 14.1 Utility data analytics industry ecosystem
- 14.2 Smart meters and advanced metering infrastructure (AMI) for energy storage
- 14.3 Advanced grid Controls and Sensors
- 14.4 Accessible energy data for end-use demand response
- 14.5 Innovative policies and adaptive social infrastructure (still in development)

- **Day 08**

Module (15) Interoperability

- 15.1 Controllers for Local Energy Networks
- 15.2 Residential Energy Management Systems

- 15.3 Financial Impacts of Smart Energy Technologies
- 15.4 The Transactive Energy Model

Module (16) Advanced Grid Applications

- 16.1 Components of Smart Enabling Demand Response, Storage and Distributed Energy Resources

• **Day 09**

Module (17) Architectural Platforms

- 17.1 Roadmap and Architecture
- 17.2 Centralized versus Un-centralized Architecture
- 17.3 Systems Interface Architecture
- 17.4 Plug-In Electric Vehicle Charging Infrastructure

Module (18) Internet of Things (of Everything) – IOT/IOE

- 18.1 The Next Generation of IOT
- 18.2 Move from Thermostat to Full Control
- 18.3 The Future of IOT/IOE

• **Day 10**

Module (19) Internet of Things World Forum Reference Model

- 19.1 Why it impacts the DSM Programs
- 19.2 Two Way Controls: Remote and at Home
- 19.3 The Power of Virtual Devices
- 19.4 SMART DEVICES
- 19.5 Smart Home of the Future : Telecom, Energy, Health
- 19.6 The Home as an Enterprise
- 19.7 Data Centric Architecture
- 19.8 More Big Data

- 20.1 Business Objects
- 20.2 Business Services in the Smart Grid

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
May 5, 2025	May 16, 2025	10 days	3100.00 $	Virtual - Online
Sept. 1, 2025	Sept. 12, 2025	10 days	8500.00 $	UAE - Dubai
Dec. 22, 2025	Jan. 2, 2026	10 days	8950.00 $	Malaysia - kuala lumpur
Dec. 7, 2025	Dec. 18, 2025	10 days	8500.00 $	oman - salalah