BOOST
THE LEADING TRAINING PROVIDER

Electrical Engineering

Advanced Side Management and the Smart Grids

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 and 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. Demand Response programs are mostly volunteer based programs that allow end customers to reduce their demand and also utility scale control actions to protect customers against price spikes. Some utilities have implemented such programs. The course will present examples of Demand Response programs.

Weather volatility is analyzed from its impact on the demand profile.

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.

This course will assist power system professionals in planning and operating a power system with increasing penetration of Demand Side Management (DSM) Programs as well as renewable resources.

The course participants gain knowledge in the many aspects of DSM programs:

Target Audience

- Electrical power generation systems and distribution engineers in utilities and industrial plants
- Managers of private electricity producers and large power consumers

- Substation engineers

Learning Objectives

- What type of utility implements a DSM program?
- How to measure the success of a DSM program?
- How are the Dispatchable Loads used by the System Operator?
- How will a DSM program affect the Market Clearing Price?
- The FIT in Tariff impacting the Economic Dispatch
- Reliability of a system with a large DSM contribution.
- Power Electronics devices essential in the operation of the power system: SVCs (Static Var Compensators)
- Load Shedding versus Dispatchable loads.
- The role played by the smart meter programs.
- The upcoming Internet of Things

Course Outline

- **DAY 01**

INTRODUCTION

  - Demand Side Management Categories
  - Demand Side Management Cost
  - Tariffs and Time-of-Use Rates
  - Demand Response Programs
  - Load Management
  - Energy Management
  - Automation and Metering Requirements
  - Internet and cloud based standards: NAESB

BULK ELECTRICITY SYSTEM

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

ENERGY MARKETS and REAL TIME PRICING

- Real Time Market
- Day Ahead Market
- Bilateral Contracts
- Terms and Structures of Renewable Contracts
- Feed in Tariffs in Canada
- Physical versus Financial Transactions
- Dispatchable Loads

- **Day 02**

LOAD DEMAND PATTERNS

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

VOLUMETRIC RISK

- Weather Response
- Weather Derivatives
- What data will be needed in future?
- What data should be collected (and analyzed) now?

LONG TERM PLANNING

- Reliability Criteria
- Generation Reserve Margin
- Loss of Load Probability
- Loss of Load Expectation
- Variable generation and their impact on the LOLP, LOLE
- CAPACITY PLANNING
- Renewable Generation
- Demand Management
- Case Study

- **Day 03**

REAL TIME PRICING and SHORT TERM PLANNING

- Day Ahead
- Real Time
- Secure Islanding of Renewable Generation
- OPERATING RESERVES IN A SYSTEM WITH RENEWABLE GENERATION
- Variability in Generation – Variability in Load
- Contingency Reserves
- Regulating Reserves
- Following Reserves
- Ramping Rates

SYSTEM CONTROLS for POWER QUALITY for DEMAND

- Power Electronics
- Static Var Compensators
- Voltage and VAR Control
- Role of Converters in the integration of Renewable Resourcs

DEMAND SIDE MANAGEMENT and the PHYSICAL SYSTEM

- Load Frequency Control
- Load Pricing Control
- Load Shedding

DEMAND RESPONSE POLICY

- ERC
- Association for Demand Response and Smart Grid

DEMAND SIDE MANAGEMENT

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

• **Day 04**

DISTRIBUTED and RENEWABLE RESOURCES - WIND and SOLAR POWER GENERATION

- Power Electronics
- Short Term variability

- Commercial
- Residential
- Impact of Renewables on the DEMAND SIDE MANAGEMENT PROGRAMS
- Adjustment Energy Cost

ENERGY STORAGE

- State of the art in energy storage
- Electrical Vehicles
- Impact on Demand Side Management Programs

SMART METER ECOSYSTEM

- Smart Meters Evolution
- Smart Meters: the new generation
- Metering Infrastructure Standards
- Advanced Metering Infrastructure (AMI)
- Utility data analytics industry ecosystem
- Smart meters and advanced metering infrastructure (AMI) for energy storage
- Advanced grid controls and sensors
- Accessible energy data for end-use demand response
- Innovative policies and adaptive social infrastructure (still in development)

INTEROPERABILITYand IMPACTS on DSM

- Controllers for Local Energy Networks
- Residential Energy Management Systems
- Financial Impacts of Smart Energy Technologies
- The Transactive Energy Model

- **Day 05**

ADVANCED SMART GRID APPLICATIONS

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

SMART GRID ARCHITECTURAL PLATFORMS

- Roadmap and Architecture
- Centralized versus un-centralized architecture
- Systems Interface Architecture
- Plug-In Electric Vehicle Charging Infrastructure

INTERNET OF THINGS (of EVERYTHING) – IOT/IOE

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

INTERNET OF THINGS WORLD FORUM REFERENCE MODEL

- How IOT impacts the DSM Programs
- The Two Way Controls: Remotely and at Home
- The Power of Virtual Devices
- SMART DEVICES
- SMART HOME OF THE FUTURE: Telecom, Energy, Health

- The HOME as an ENTREPRISE
- Data Centric Architecture
- Big Data

Semantic Technologies and the Internet of Services

- Business Objects
- Business Services in the Smart Grid

North American Electricity Reliability Council (NERC) STANDARDS

- Standards – Smart Grid Interoperability Panel (SGIP), IEEE, NIST, IEC, NARUC,others

CYBER SECURITY

- Compliance
- Blockchain – The Next Line of Defence

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
June 30, 2025	July 4, 2025	5 days	4250.00 $	UAE - Abu Dhabi
Sept. 22, 2025	Sept. 26, 2025	5 days	4950.00 $	Spain - Madrid
Dec. 15, 2025	Dec. 19, 2025	5 days	4250.00 $	UAE - Abu Dhabi