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Load Forecasting in Smart Grid Power Systems

View Course Details

COURSE DATES AND TIMES

Load Forecasting in Smart Grid Power Systems - This 12-hour live online instructor-led training course presents the most advanced methodologies to forecast the load in the short, medium and long term, in light of the integration of new technologies, regulatory changes and the penetration of renewable energy resources facilitated by the operating flexibility brought by power electronics.

The unique characteristics are discussed from a local, consumer centric and also from a system perspective bringing to life the ever changing paradigm for delivery energy to customers. Interoperability aspects and standards are discussed, as well as the consumer centric paradigm of Transactive Energy.
The course defines AI and machine learning and their relevance to the forecast of demand profiles. Special attention is given to the advanced AI applications and Machine Learning for load forecasts.

The course introduces the Blockchain as a new line of defense against cyber threats and its increasing application in P2P and Renewable Certificates. This course is designed for the management and practitioners in the power industry. It presents modern load forecasting methodologies in the context of the latest trends and technologies in the power system.

WHO SHOULD ATTEND

This course will benefit electric utility transmission and distribution engineers and managers, industrial, commercial and institutional electrical professionals and property managers of any condo complex or university campus, law firms and any entity with interests in load or energy forecasting, green energy and conservation.

STUDENTS RECEIVE

- FREE 100-Page Digital T&D Automation Handbook (Value $20)
- $100 Coupon Toward Any Future Electricity Forum Event (Restrictions Apply)

- 1.2 Continuing Education Unit (CEU) Credits (12 Professional Development Hours)
- FREE Electricity Today T&D Magazine Subscription (Value $25.00)
- Course Materials In PDF format

COURSE OUTLINE

Load Forecasting in Smart Grid Power Systems - Course Outline

DAY ONE (6 hour course)

LOAD FORECASTING METHODOLOGIES and DEMAND SIDE MANAGEMENT

1. Introduction:

- Historical Evolution of the Electrical Power Systems
- Performance Requirements: Power System Controls
- Active Power and Reactive Power Control in RENEWABLES and DER
- Regulatory Frameork in North America and Europe: NERC, ENTSO
- Control Operator-ISO, Dispatcher: Reliability, Adequacy, Security limits, Operating States
- Power System Control Actions: Voltage Reduction, Load Shedding
- Abnormal frequency, restoration plans

2. LOAD DEMAND PATTERNS

- Short Term Load Forecasting Models: Operating Time Frame
- Long Term Load Forecasting: Planning Time Frame
- Load Forecast Uncertainty, MAPE Index
- Best business practices
- Weather Normal load forecasting

3. METHODOLOGY for SHORT TERM LOAD FORECAST ARTIFICIAL INTELLIGENCE

- AI and Artificial Neural Networks- ANN
- AI and ANN Applications in Power Systems:
- Machine Learning
- Autoregressive integrated moving average
- Method (ARIMA) Discuss outliers
- Density?based clustering techniques

Support vector regression techniques

- MAPE - improved methodology
- Training the algorithm for Short Term Load Forecast and Solar Energy Forecasts
- Volumetric Risk: Weather Response
- Weather Normal Load Database
- Industry methods: ITRON

4. METHODOLOGY for LONG TERM LOAD FORECASTING: ECONOMETRIC MODELS

- Assumptions
- Key Drivers
- Customer Classes and sectors
- Customer Delivery Point Forecast
- Macroeconomics: GDP Forecast, Population Growth
- Conservation and Demand Management Forecast
- Weather Correction Analysis
- Annual Econometric Model
- Monthly Econometric Model
- Methodology for Customer Forecast

5. DEMAND SIDE MANAGEMENT and the PHYSICAL SYSTEM

- Load Frequency Control
- Load Pricing Control
- Load Shedding

6. SMART METER ECOSYSTEM

- Utility data analytics industry ecosystem
- Smart meters and advanced metering infrastructure (AMI)
- Advanced grid controls and sensors
- Accessible energy data for end-use demand response

7. ENERGY STORAGE and DEMAND SIDE MANAGEMENT

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

8. MARKET ECONOMICS: Examples from Canada, Europe, USA

- Example : Design of an Electricity Market
- Real Time Market
- Economic Dispatch: Constrained and Unconstrained Dispatch

DAY TWO (6 hour course)

SMART GRID

9. INTEGRATION OF SMART GRIDS with a MODERN DISTRIBUTION UTILITY

- Communication Requirements
- Relief to Distribution UtilitiesSystems Interface Architecture
- Impact of Plug-In Electric Vehicle Charging Infrastructure on the LOAD PROFILE

10. SMART GRID STRATEGY

- Automation and Control
- Grid and a Transactive Operation
- Societal Benefits of the Smart Grid
- ADVANCED SMART GRID APPLICATIONS: Components of Smart Enabling Demand Response, storage and DER

TRANSACTIVE ENERGY

11. The Big Picture- Vision 2030

- TRANSACTIVE ENERGY - THE PROSUMER
- P2P Energy Trading
- Distributed Energy Resources and Communication Requirements
- Collaboration between Market Entities and Government Agencies
- Cloud Services for Utilities – NAESB for GREEN BUTTON and ORANGE BUTTON

12. IOT – Internet of Things

- A brief look into Interoperability
- Most utilized IOTs
- IOE- Internet of Everything
- Role of the IED

13. INTERNET OF THINGS WORLD FORUM REFERENCE MODEL

- How it impacts the Conservation and Demand Response Programs-The Power of Virtual Devices
- SMART DEVICES
- THE SMART HOME OF THE FUTURE: Telecom, Energy, Health/ The HOME as an ENTREPRISE
- THE SMART CITY

14. BLOCKCHAIN

- Security Certification ; Vulnerability
- Blockchain Applications in the Power Industry-
- P2P Trading
- Trading Renewable Certificates

COURSE SCHEDULE:

Both days:

Start: 10 a.m. Eastern Time
Finish: 4:30 p.m. Eastern Time

Contact us Today for a FREE quotation to deliver this course at your company's location.

Request Quote