Content Community Connection

United States
The Electricity Forum Inc.
742 Pre Emption Road
Geneva, NY 14456
Tel 289-387-1025

Canada
The Electricity Forum
1885 Clements Rd, Unit 218
Pickering, ON L1W3V4
Tel 905-686-1040
Fax 905-686-1078
Toll Free 855-824-6131

Distribution Automation Training

View Course Details

COURSE DATES AND TIMES

Distribution Automation Training - This 12-hour live online instructor-led course focuses on how to Increase the hosting capacity of distributed generation in power distribution systems as a key low-carbon solution to help meet the aggressive greenhouse gas emission reduction targets in the energy sector.

The deployment of distributed generation technologies is creating a paradigm shift of the way energy is produced, traded, distributed, and utilized. Although such shift is unparalleled, it is accompanied with serious accommodation challenges in existing outdating/aging power distribution systems infrastructure. Thanks to Distribution Automation, one of the smart grid pillars, that offers new digital technologies to be integrated within existing utility grids in order to substantially improve the overall efficiency and reliability of the network as well as facilitating seamless accommodation of distributed generation.

This 12-Hour Distribution Automation training course provides participants with a practical understanding of energy consumption, power distribution systems operation and control, the technical challenges that power utilities currently face to accommodate distributed generation in their distribution networks, and the most recent interconnection requirement standards of distributed generation in North America. The course also provides participants with the required knowledge to understand, assess, and analyze the technical and economical needs of adopting Distribution Automation technologies to mitigate such technical challenges and enhance the operation and reliability of power distribution systems.

This course covers topics related to the transformation of power distribution systems from their conventional structure with unidirectional power flow towards smart distribution grids.

STUDENTS RECEIVE

After participating in this Distribution Automation Training course, participants will be able to:

- Analyze load profile and energy consumption of residential, commercial, and industrial loads
- Recognize the modelling and performance analysis of power distribution systems

- Quantify the technical merits of implementing Distribution Automation solutions for Volt/Var control, outage management and system reliability, Demand Response, and integration of distributed generation and microgrids
- Being familiarized with the most recent standards for interconnection requirements of DG in IEEE and North America
- Identify technical interconnection challenges for distributed generation in power distribution systems
- Hands-on training with Commercial Software tools to study and analyze practical aspects of distribution systems performance taking into account Distributed Generation and Distribution Automation

- **FREE** 100-Page Digital Electrical Safety 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** Magazine Subscription (Value $25.00)
- Course Materials In Paper Format

COURSE OUTLINE

Distribution Automation Training Course Outline

Instructor:

Hany Farag, PhD, PEng, SMIEEE,

DAY ONE

1. Legacy of Smart Distribution Networks

- Distribution Substations
- Radial Distribution Feeders
- Map of Distribution Feeders
- Electrical Characteristics Of Distribution Feeders
- Distributed Generation and Energy Storage Systems
- Electric Vehicles
- Smart Meters, Two Ways Communication, and Intelligent Control
-

2. Load Characteristics and Matrices

- Individual Customer Load
- Residential, commercial, and industrial loads
- Customer Class
- Peak and average demand
- Load factor

- Load profile analysis
- Tariff and charges (Time of Use and Electricity Market)
- Distribution Transformer Loading
- Diversified and maximum diversified demand
- Load duration curve
- Maximum non-coincident demand
- Diversity, demand, and utilization factors
- Load diversity

3. Load Models

- Constant Real and Reactive Power Loads
- Constant Impedance Loads
- Constant Current Loads
- Combination Loads
- Two-Phase and Single-Phase Loads
- Shunt Capacitors
- Three-Phase Induction Motor

4. Distribution Feeder and Transformer Models

- Exact Line Segment Model
- Approximate Line Segment Model
- The Delta-Ground Wye Step-Down Transformer Connection
- The Underground Wye-Grounded Wye Connection
- The Delta-Delta Connection
- The Open Wye-Open Delta Connection

5. Distribution Systems Analysis

- Service Entrance Requirement for New Customers
- Voltage Drop Calculations
- Power Loss Calculations
- Distribution Power Flow (DPF) Analysis
- Short circuit and Arc Flash Analysis
- Customer Reliability Indices

6. Framework of Distribution Automation in Smart Grids

- Traditional Substation Automation
- Intelligent Electronic Devices (IEDs)
- Remote Terminal Units (RTUs)
- Advanced Metering and Information Technologies (AMI)
- Interoperable Communication Networks (IEC 61850)

7. DA Application #1: Integrated Voltage and Reactive Power Control (IVVC)

- Volt/Var control devices
- Substation Load tap changers
- Line voltage regulators
- Shunt capacitors
- Local and Remote Control of Volt/Var devices
- Volt/Var Optimization (VVO)
- Conservation Voltage Reduction (CVR)
- Automated Power Factor Correction

DAY TWO

8. DA Application #2: Fault Detection, Isolation, and Load Restoration (FDIR)

- Fault Detection Mechanisms
- Isolation of Faults
- Software applications for Outage Management
- Automated and Optimized Service Restoration

9. DA Application #3: Demand Response (DR)

- Dispatchable Loads
- Load management
- Peak Shifting
- Peak shaving and reduction of peak demand
- Applications of energy storage technologies in demand response

10. Distributed Generation Technologies

- Wind Turbines
- Solar Panels
- Fuel Cell
- Micro-hydro
- Micro-turbine
- Small Modular Reactors (SMR)
- Operation Characteristics of DG technologies

11. Grid Interface Technologies of DGs

- Power Electronic Converters
- Voltage Source versus Current Source Inverters
- Control and Protection Mechanisms

- Contribution to Short Circuit Current
- Synchronous Machines
- Permanent Magnet and Self-excited
- Control and Protection Mechanisms
- Contribution to Short Circuit Current
- Induction Machines
- Variable and Fixed Speed Technologies
- Control and Protection Mechanisms
- Contribution to Short Circuit Current

12. Integration Challenges of DGs with power grids

- Impacts of DG integration on the protection coordination
- Islanding Detection
- Impacts of DG integration on Voltage Regulation and System Losses
- Impacts of DG integration on Power Quality (Harmonics, Voltage flickers, sags, swells)
- Impacts of DG integration on the system reliability

13. Utilities Technical Interconnection Requirements of DGs (IEEE, Hydro One, LDCs)

- General Requirements (safety, PCC, grounding)
- Performance Requirements (Power quality, Disturbances, Resonance)
- Protection Requirements
- Operating Requirements
- Telecommunication Requirements
- Reporting and Metering Requirements

14. Distribution Automation for Successful DG Integration and Deployment of Microgrids

- Mitigation of voltage regulation challenges
- Islanding detection
- Applications of DA to enhance outage management with DG interconnection
- What is microgrid?
- Differences between microgrids and conventional power grids
- Microgrids operation and control: grid-connected and islanded
- Distribution systems reliability assessments with consideration of microgrids
- Energy management design for microgrids
- Techno-economic analysis for microgrid projects

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