

GRIDED

The Center for Grid Engineering Education

Information and Communications Technologies for Distributed Energy Resources

Monitoring and Management for Solar, Storage, Flexible Loads, and Electric Vehicles

Course Description

This course trains participants in understanding and applying the information and communication technologies (ICT) for electric grid's distributed energy resources (DER) and systems (e.g., demand response, solar, energy storage, and electric vehicles). The technologies include communication protocols and models available for exchanging DER data for monitoring and management.

Electric utilities and grid operators across the world are looking at solutions for effective use and operation of the smart grid in the era of increasing deployments of DER technologies such as solar, energy storage, and flexible loads for demand response (DR). A key element of the solution is to enable interoperable and cost-effective monitoring and/or control of these resources. Example applications include leveraging grid-facing services across a variety of types, makes, and models of grid-connected DER; optimization of the dispatch of front-of-the-meter and behind-the-meter DERs through advanced distribution grid control systems such as Distributed Energy Resourced Management Systems (DERMS) and DR Management Systems (DRMS); and enabling data analytics for grid modeling and to unlock new undiscovered benefits from DER management. While some regions offer DR programs, others are aggressively deploying distributed generation and electric vehicles. Under this not-so-distant future state underlies the ICT backbone that supports access and management of DER devices and systems.

This course will provide DER 101 and background on the communication technologies and half-a-dozen data protocols (each with a unique purpose) available for communicating with DERs over a diversity of grid networks, the associated information models to define the format and meaning of data transported over these protocols, example applications of deployment these protocols and data models for interoperability, and summarize the trajectory of adoption of these technologies in the smart grid.

The course will answer questions like "What is a DER?" "What communication technologies and architecture are recommended for DER?" "Why are communications important for DER?" "What standards are out there to streamline communicating with DER at interconnection and over the life of the device?" "Why is interoperability important for DER?" "Who are the responsible parties for adopting these standards?"

Who Should Attend

The course is intended for anyone interested in the opportunities to incorporate distributed energy resources into the grid and how these technologies will change the way the modernized grid functions. Participants will include utility engineers and technicians, procurement officers, regulatory compliance staff, legal staff, and possibly regulators. Previous technical training is helpful but not necessary. This course will cover the fundamentals of DER technologies.

Registration Information

Date: September 12th, 2019
8:00 am – 5:00pm
Course Length: 8 hours
Location: Schermerhorn Symphony Center – Board Room
1 Symphony Pl
Nashville, TN 37201

Registration: <http://www.cvent.com/d/ryqxq4>
• \$800 per person
• 20% discount for organizations with three or more attendees
• 25% discount for government employees (non-utility)
• 25% discount for university professors*
• 75% discount for graduate students*
*University IDs required to qualify for professor or graduate student discounts.

Students need to bring: laptops or tablets to access online resources and to follow class notes. Wi-Fi access is provided. Lecture slides will be provided electronically in PDF format.

EPRI Contacts

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Meet the Instructors



Rish Ghatikar is a Senior Program Manager and leads the information and communication technologies (ICT) for distributed energy resources (DER) and integration research at Electric Power Research Institute (EPRI) in Palo Alto, California. The research identifies, creates, and transfers ICT-centric solutions for the adoption of DER into the power systems.

Rish's work has appeared in over 90 publications and he holds Masters degrees in Telecommunication Systems/Computer Technologies and Infrastructure Planning.



Ben Ealey is a Senior Project Manager in the Information and Communication Technology (ICT) Program at the Electric Power Research Institute (EPRI). He is a member of the ICT for DER team and his work focuses on achieving interoperability with DERs to streamline integration of DER at the time of interconnection and over the life of the system. Ben has experience with contributing to standards updates, hands on experience with evaluating ICT standards and interoperability in devices, and leading industry-working groups focused on overcoming interoperability barriers.

Ben holds a Master's of Science in Electrical Engineering – Communication Theory and a Bachelor's of Science in Electrical Engineering from the University of Tennessee.

Course Outline

Session 1 (morning)

The Context for DER Technologies, Communications, and Systems

(8:00 a.m. – 12 noon)

- 1.1 The Value of a Grid-Connected DER
 - Grid Modernization Paradigms
 - Distributed Energy Resources 101
 - Value Domains – Customer and Grid Management
- 1.2 Information and Communication Technology Fundamentals for DER
 - Communication and Control Protocols
 - Information Models | Data Definitions
 - Interoperability and Interconnection
- 1.3 Standards to Streamline Grid Interoperability
 - Smart Grid Actors and Domains
 - Standards by DER Domain and Purpose
 - Example Implementations and Integrations

Session 2 (afternoon)

A Deep Dive into Standards, Tools, and Reference Implementations

(1:00 p.m. – 5:00 p.m.)

- 2.2 ICT Maturity – Present and Future States
 - Comparison of Alternatives
 - ICT in Industry Requirements, Mandates, and Grid Codes
- 2.3 Tools for Implementation
 - Open Software and Modeling Tools for Implementation
 - Drivers for Testing and Certification
- 2.3 Market Based Applications and Takeaways
 - Grid Services using DER Technologies
 - Benefits of DER for Grid Reliability and Resiliency

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