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Flexibility of The Smart Grid

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COURSE DATES AND TIMES

The system automation is increasingly sophisticated with advanced information technology and digital controls leading to a network that not only benefits from with self-healing elements but then again it facilitate new business models for all classes of customers.

The salient attribute of the Smart City resides in its ability to gradually integrate information system services of each vertical ranging from key services such as health, education, transportation, power grid etc., of the city necessary to provide public services to citizens efficiently. The Smart City extends further, into new ways to consume and access entertainment. These changing behaviours of consumers with increased expectations induce massive challenges and requirements.

This extends the customers engagement with utilities or power providers to new type of contractual arrangements and innovative access to information. Electricity customers emulate the enterprise as they represent the new platform of big data, smart energy appliances or programs and online mobile applications.

The course examines the platform of the smart grid, its multiple layers and the multiple controls over the grid and its relationship to customers and provides examples on how it expends on the smart city. At grid level, the course looks further into power electronic technologies as a more effective and economical operation of the grid.

The important aspect of Privacy and Cyber Security is addressed, introducing the Blockchain as a new line of defense against cyber threats.

WHO SHOULD ATTEND

Electric Utility T&D Managers and Electrical Engineering Professionals, Consulting Electrical Engineers, Industrial, Commercial, Institutional Electrical Engineers, Energy Managers, Electrical Engineering Graduate Students

STUDENTS RECEIVE

Students will gain insight into tall technical aspects of the smart grid that is consumer centric, its latest policies and technologies and its various business models.

1. CONSIDERATIONS OF SMART GRIDS

- **The Big Picture**
- **Transactive Energy**
- **Distributed Energy Resources**
- **Communication Requirements**
- **Optimal Configuration**
- **The connected World**
- **Collaboration with other Market Entities and Government Agencies**

2. ARCHITECTURAL PLATFORMS

- **An Architecture Model of the Smart City**
- **The Evolving Architecture of the Smart City**
- **Roadmap and Architecture**
- **Centralized versus un-centralized architecture**
- **Systems Interface Architecture**
- **Power Electronics**
- **Static Var Compensators**
- **Distribution Voltage and VAR Control**
- **Intelligent Transformers**
- **Plug-In Electric Vehicle Charging Infrastructure**
- **The connected world of the Smart City: Sky, Highways, City**

3. CHANGES IN CUSTOMER BEHAVIOURAL PATTERNS

- **Utilize the Sky**
- **Smarter Cars and Highways**
- **The home as an enterprise**
- **Design individual entertainment**
- **Service oriented IT platforms**

4. THE FLOW OF INFORMATION: INTEROPERABILITY

- **Central Cloud based Data Management**
- **Challenges ahead**

5. METERING INFRASTRUCTURE

- **Advanced Metering Infrastructure**
- **Controllers for Local Energy Networks**
- **Residential Energy Management Systems**
- **Big Data**

6.   RENEWABLE GENERATION RESOURCES

- **Solar Power**
- **Wind Power**
- **AC and DC networks using semi conductor switches**
- **Grid connected Renewable Resources**
- **Distribution network connected Distributed Resources**

7.   ELECTRIC ENERGY STORAGE

- **Storage Technologies**
- **Electrical Vehicles**

8.   ADVANCED GRID APPLICATIONS

- **Enabling Demand Response, Storage and Distributed Energy Resources**
- **HVD, FACTS**
- **The Distribution Network**

9.   SMART METER ECOSYSTEM

- **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)**

10.   INTEROPERABILITY and IMPACTS on Demand Management

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

11.   ADVANCED GRID APPLICATIONS

- **Components of Smart Enabling Demand Response and Storage**
- **Distributed Energy Resources**
- **Controls in smart grid**

- **Weather Response**

19. PLANNING

- **Renewable Energy Forecast**
- **Demand Management**

20. North American Electricity Reliability Council (NERC) STANDARDS and REQUIREMENTS

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

21. THE SMART CITY – A CONNECTED WORLD

- The networks: Wired and wireless, bandwidth, connectivity
- The Service Oriented Architecture
- **Availability and Scalability**
- **Social Adaption and App development**
- **Smart City Business Model**

22. CYBER SECURITY

- **Privacy**
- **Security Certification**
- **Vulnerability**
- **Blockchain**

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