

Southeastern Distribution Apparatus School & Conference

Module 100	Module 200	Module 300	Module 400
------------	------------	------------	------------

Monday

10:00 - 1:00	Registration
1:00 - 2:00	General Session - Keynote Speaker: Tino Mantella, <i>Technology Association of Georgia</i>
2:00 - 3:00	Forensic Engineering of Accidents - John Matthews
3:00 - 3:30	Networking Refreshment Break
3:30 - 5:00	Forensic Engineering of Accidents - John Matthews Continued
5:00 - 6:30	Hospitality / Exhibit Hall

Tuesday

8:30 - 10:00	Electrical Fundamentals & Power Theory	Substation Breakers	Smart Grid Industry Update Combined Session	
10:00 - 10:30	Networking Refreshment Break in Exhibit Hall			
10:30 - 12:00	Substation Devices & Equipment Overview	Application of Voltage Regulators and Capacitors	Cyber-Terrorism Defense - Protecting Our Nations Critical Infrastructure	Voltage Control with Distributed Generation
	Lunch			
1:00 - 2:30	Distribution Devices & Equipment Overview	Underground Apparatus	SCADA Principles	Environmental Impacts of Smart Grid & Challenge of Connecting Electric Vehicles
2:30 - 3:00	Class Photo		Networking Refreshment Break in Exhibit Hall	
3:00 - 4:30	Transformer and Arrow System Combined Session		RTU's / IED's / Protocols	Improving Electric Power System Optimization
4:30 - 6:00	Hospitality / Exhibit Hall			

Southeastern Distribution Apparatus School & Conference

Module 100	Module 200	Module 300	Module 400
------------	------------	------------	------------

Wednesday

8:30 - 10:00	Voltage Regulators & Capacitors	Overvoltage Protection	Data Management with Cloud Computing	Event Report Analysis
10:00 - 10:30	Networking Refreshment Break in Exhibit Hall			
10:30 - 12:00	Fundamentals of Distribution Feeder Protection	System Protection	Communication Technology	Power Quality Issues and Solutions for Utility Distribution Systems
	Lunch			
1:00 - 2:30	SCADA & Communication Technology	Protective Grounding	Distribution Automation	Cost/Benefits Analysis of Smart Grid Investments
2:30 - 3:00	Networking Refreshment Break			
3:00 - 4:30	Test & Measurement Equipment with Hands-On Lab	Protective Grounding Continued	Fault Detection Isolation Restoration Implementation	Utility Project Assessments
5:00 - 6:30	Annual Dinner - Ribs by Port-a-Pit BBQ			

Thursday

8:30 - 10:00	Installation and Analysis of Solar & Wind Power - Steve Blume Combined Session
10:00 - 10:30	Networking Refreshment Break
10:30 - 12:00	Installation and Analysis of Solar & Wind Power - Steve Blume Combined Session
12:00	Closing Session

Classes are open to all attendees and exhibitors

www.utilitytech.org

Keynote Speaker

Tino Mantella, President

Technology Association of Georgia

www.tagonline.org

Combined Session

Forensic Engineering of Electrical Accidents

Instructor: John Matthews, Ph.D., John Matthews & Associates

The expertise to understand an electrical related accident or injury as the result of electrical fires, arc-flash, electrical contact or electrocution is critical to determining the real cause of the incident. This class will be a combination of electrical safety, forensic examination techniques and industry case studies.

Module 100:

Fundamentals of Distribution System Apparatus

Electrical Fundamentals & Power Theory

Instructor: Jonathan Weaver, Jackson EMC

AC and DC circuit theory including ohms law and associated math, circuit components, and current and voltage laws. Included are discussion of the relationship between current, voltage, resistance, impedance, power and energy. An expansion of the basic electricity review class – with an elaboration on volts, amps, power factor, etc. Definition and applications of KW, KVA, the power triangle, and calculating power factor.

Substation Devices & Equipment Overview

Instructor: Larry Woody, Georgia Power

Get an overview of key substation equipment and devices such as: Station Transformer, Station Breaker, Substation Batteries, Station Service, PF Correction Banks, Reactors & Voltage Regulators. This course will focus just on the devices and equipment found within the Substation fence. It will give you a high level understanding of how a substation works.

Distribution Devices & Equipment Overview

Instructor: Michael Hall, Snapping Shoals EMC

Get an overview of key distribution equipment & devices outside the Substation fence such as: transformers, capacitor banks, regulators, fuses, lightning arrestors, reclosers, etc. This class will show how equipment works and coordinates together. It tries to explain at a high level how the distribution system works as a whole.

Transformers & Arrow System

Instructor: Tony Kiser, Georgia Power

Discussion in this class will include components and internal workings of a transformer. Covers how a transformer works and how it is used on the distribution system. Learn the meaning of transformer polarity and how to easily hook up transformer banks using the Arrow System. **Combined with Module 200.**

Voltage Regulators and Capacitors

Instructor: Keith Hardt, City of Washington

Explanation of why voltage regulators are needed and how they work. Topics include the placement of regulators, settings, and effects on the distribution system. Class will cover safety considerations of voltage regulators. Also a

discussion on why capacitors are used in the distribution system and how they work. Defines terms such as working power, non-working power and power factor. Also, how they work in conjunction with regulators which also affect system voltage. It will include applications, testing, inspection, safety issues and connections.

Fundamentals of Distribution Feeder Protection

Instructor: Craig Wester, GE Digital Energy

This class provides a basic understanding of the principles of relaying and protection of the electric distribution feeder. Topics included in this class are why relays are used, how relays protect the feeder, applications of various types of relays, and relay coordination.

SCADA & Communication Technology

Instructor: Steve Strauss, Survalent

An introduction of all the components involved in a SCADA system. The types of components to be discussed are RTUs, master stations, digital and analog inputs / outputs, and IEDs. This class will also cover some of the options for communication with equipment in the substation and on the distribution lines. Students will be introduced to common communication terminology. Some of the options discussed will be serial, fiber optics, Ethernet, radio, and telephone.

Test & Measurement Equipment

Instructors: Wayne Armstrong, Megger; Nathan Pesonius, Hipotronics, Inc.; Ron Shaw, Florida Transformer

This class explains the purpose and operation of testing devices for equipment such as transformers, capacitors, arrestors, vacuum bottles, batteries, reclosers, and insulating oil. The class will provide a opportunity for hands-on application of various test equipment.

Module 200:

Principles & Applications of Distribution System Apparatus

Substation Breakers

Instructor: Tom Hix, Georgia Power

This class will include common functions, types, how breakers work and why the equipment is used. Learn about protection schemes, protective relays and how to bypass breakers. Learn about the different interruption mediums such as oil, SF6 or vacuum. Discusses testing, inspection & sampling practices. Students will learn about the components of dissolved gas analysis testing.

Application of Voltage Regulators / Capacitors

Instructor: Ted Johnson, Georgia Power, Retired

This class will center on how a regulator works and the internal components. Covers how they are used in distribution systems along with basic operation & functions. How they work in conjunction with line capacitors which also affect system voltage. Covers safety issues such as by-passing & deenergizing regulators. Basic inspection procedures.

Underground Distribution / Equipment

Instructor: Anthony Parrott, ABB

This class will cover manual switch gear, remote supervisory switch gear, Source-Transfer Models, and underground capacitor banks. Discussion of live and dead front gear. Common practices and uses and applications of underground switch gear.

Transformers & Arrow System

Instructor: Tony Kiser, Georgia Power

Discussion in this class will include components and internal workings of a transformer. Covers how a transformer works and how it is used on the distribution system. Learn the meaning of transformer polarity and how to easily hook up transformer banks using the Arrow System. **Combined with Module 100.**

Overvoltage Protection

Instructor: Steve Brewer, Hubbell Power Systems

Covers how arresters work and their use in the distribution system. It introduces the student to how lightning and other causes create overvoltage on the system. We also introduce the student to the concepts of BIL (Basic Insulation Level) ratings of equipment / hardware. We discuss the importance of properly grounding the system to make arresters operate properly.

System Protection

Instructor: Dwayne Tector, Georgia Power

Study of power system faults and application of relays for power system protection. Covered in this class will be reclosers, sectionalizers and fuses. How they operate and how they are used on the distribution system.

Protective Grounding

Instructor: Steve Blume, Applied Professional Training

This class gives a comprehensive understanding of the theory and practice of safe electrical grounding principles as it relates to the individual. There will be discussion on the OSHA requirements, understanding ground potential rise, touch and step potential, and vehicle safety along with applications, principles and procedures related to grounding.

Module 300:

SCADA, Communications, and Emerging Technology

Smart Grid Industry Update

Instructor: John McDonald, GE Digital Energy

This class will define Smart Grid, and discuss why a Smart Grid is needed. The difference between “Smart” Grid and a “Smarter” Grid is presented along with six Smart Grid solutions being developed by GE. The need for Smart Grid interoperability will be discussed, and the NIST conceptual model is presented. The importance of cybersecurity, privacy of information, and policy with Smart Grid will be covered. Lastly, Smart Grid recent deployments and lessons learned are presented. **Combined with Module 400.**

Cyber-Terrorism Defense - Protecting Our Nations Critical Infrastructure

Instructor: Steven Dyer, Central Service Association

This is a fast paced discussion on how to protect our critical infrastructure. Real world examples of hacking and demonstrations of how easy it is to break into almost any system. Cyber-Terrorism Defense informs participants not only how to combat cyber-terrorism, but also shows the history of how we came to the place we are today. It answers the question of who is really out there and why they want access to our information.

SCADA Principles

Instructor: Jim Baehr, *QEI, Inc.*

This class will be a comprehensive coverage of the monitoring and control of a SCADA system. Learn how and why a SCADA system is utilized by the utility. Students will gain an understanding of the terminology, uses of data, field devices installed, and how the operator interfaces with the system.

RTU's / IED's / Protocols

Instructor: John Gwin, *Power Connections*

The class will discuss in depth the traditional RTU functions such as digital and analog input / output, control and monitoring, IED interfaces and functionality. There will also be discussion about programming special applications, and the RTUless substation. SCADA Protocols (DNP 3.0 and legacy/proprietary) will be included in this class.

Data Management with Cloud Computing

Instructor: Brian Crow, *Verdeco*

Discussion on big data in the smart grid environment and cloud based applications to turn the data into actionable insight.

Communication Technology

Instructor: Tommy Childress, *TC Services*

How does data accumulated from a SCADA system get back to the utility? This class will discuss the various methods of communication used inside the substation, also between the utility, the substation and line devices. There will be an overview of the most common communication network topologies.

Distribution Automation

Instructor: Chris Evanich, *Thomas & Betts*

This class will discuss a distribution automation scheme and how to control through SCADA. Also topics on various communication applications.

FDIR Fault Detection Isolation Restoration Implementation

Instructor: Daniel Greenway, *Cobb Energy*

The automated isolation and restoration of distribution feeder faults is one application that can have a significant impact on improving system reliability and quality of service, while laying a foundation for additional feeder optimization. The class will discuss how a utility has implemented centralized FDIR to take full advantage of remotely controlled switches on its system.

Module 400: Engineering Topics

Smart Grid Industry Update

Instructor: John McDonald, *GE Digital Energy*

This class will define Smart Grid, and discuss why a Smart Grid is needed. The difference between "Smart" Grid and a "Smarter" Grid is presented along with six Smart Grid solutions being developed by GE. The need for Smart Grid interoperability will be discussed, and the NIST conceptual model is presented. The importance of cybersecurity, privacy of information, and policy with Smart Grid will be covered. Lastly, Smart Grid recent deployments and lessons learned are presented.

Combined with Module 300.

Voltage Control with Distributed Generation

Instructor: Tom Haire, *Rutherford EMC*

A look at the application of connecting a distributed generation system to an existing distribution system.

Discussion on the aspects of voltage control along with requirements for connection standards.

Environmental Impact of Smart Grid & Challenge of Connecting Electric Vehicles

Instructor: Steven Bossart, *National Energy Technology Laboratory- US DOE*

Smart Grid will impact emissions of carbon dioxide, sulfur dioxide, nitrogen oxides, and particulate by creating improved grid intelligence and control that enables demand response, electric vehicles, variable renewables and distributed energy resources, more efficient transmission and distribution systems, energy storage, and customer energy management devices and smart appliances. Environmental emissions will be effected by cycling generating plants to serve the portion of load that is unmet by variable generation from renewables like wind and solar. As more plug-in electric vehicles are charged by the electricity grid, the government and electric power industry must address operational and policy challenges such as local transformer overload, mobility of load, billing, data security and privacy, and gas tax recovery. Also a discussion on the capital and operating costs for electric vehicles.

Improving Electric Power System Optimization

Instructor: Joe Miller, *Horizon Energy Group*

A modernized grid can provide benefits to all stakeholders. Perhaps the most significant benefit of all can be achieved by improving the optimization of grid assets. Today's limitations in asset optimization will be presented and the value of optimizing across multiple domains such as reliability, economics, environmental, and security in the future will be explored. The role of the Smart Grid in enabling power system optimization will be highlighted. The feasibility and value of emerging optimization concepts such as "Microgrids" and "Demand Dispatch" will also be presented.

Event Report Analysis

Instructor: Jeff Gregory, *Power Connections*

Deduce causes for system faults based on available event report data and determine a solution using the event report analysis process.

Power Quality Issues and Solutions

Instructor: Pat Coleman, Don Chancy, *Alabama Power*

This class will focus on typical problems that are associated with low power quality. Also in this module, we will separate "power quality" from "bad engineering" while providing numerous examples of each. Power quality topics discussed include voltage drop, harmonics, capacitor switching, grounding, and others.

Cost/Benefits Analysis of Smart Grid

Investments

Instructor: Jeff Roark, *Electric Power Research Institute*

Smart Grid investments can improve existing service, but they also enable new services, energy sources, and energy uses that today's grid cannot accommodate. EPRI recently reported that a full implementation of smart grid could provide present-value benefits of at least \$1.3 Trillion on investment as high as \$476 Billion. This talk will examine this report and discuss the nature of these estimates. Full implementation is years away, as many budget-conscious utilities continue to squeeze value from still-functioning existing equipment. Recent stimulus funding earmarked for smart grid investment has provided a jump-start, prompting a wave of smart grid demonstration projects across the country.

EPRI's Smart Grid Demonstration Project coordinates a series of smart grid demonstrations to maximize industry

learning from demonstration projects, advancing industry understanding of where, how, and why smart grid technologies perform as they do. By applying scientific methods, the demonstration projects produce credible, supportable physical results that can be verified by others, providing a firm basis for cost-benefit analysis. The talk will examine the joint efforts by DOE and EPRI to focus the demonstrations to produce data on costs and benefits to help utilities and regulators in smart grid decision making.

Utility Project Assessment

Instructor: Steve Daniel, *Alabama Power*

Implementation of a fully automated underground loop-sectionalizing scheme. Discussion on the switchgear requirements, automation and monitoring requirements and exibility of future expansion.

Installation and Analysis of Solar & Wind Power

Instructor: Steve Blume, *Applied Professional Training*

This seminar provides an overview of small solar photovoltaic (PV) and wind turbine renewable energy sources sizing, installation and operations. The Solar PV part of the seminar includes how solar PV energy is converted to utility grade electrical power for consumption, grid-tie production, and associated equipment. Basic design concepts such as system planning, sizing, configuration, efficiency and wiring are discussed. The design concepts include solar path analysis, shading, proper panel positioning, installation, and Safety.

Wind Power Systems portion of the seminar covers the fundamentals of how wind turbines work, systems are sized, designed and installed. The seminar provides an overview of micro turbines (under 1kW), small turbines (under 100kw) and large turbines (2.5MW and above) and their particular equipment and operating characteristics. The student learns about wind dynamics for system sizing, practical applications such as grid-tie and Safety.