

Southeastern Distribution Apparatus School & Conference

Module 100	Module 200	Module 300	Module 400
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Monday

10:00 - 4:00	Registration
1:30 - 1:45	General Session
1:45 - 2:30	<i>Keynote Speaker</i> Ron Chebra, <i>EnerNex</i> Advanced Technologies Tailored for the Field Personnel
2:30 - 3:00	Networking Refreshment Break
3:00- 4:00	Jeremiah Talmantes, <i>Red Team Security</i> White Hat Hacking: Full-Force Red Teaming & Tradecraft
4:00 - 5:30	Hospitality / Exhibit Hall

Tuesday

8:30 - 10:00	Protective Grounding	SCADA Principles	Grid Architecture: Discipline, Insights, and Recent Results
10:00 - 10:30	Networking Refreshment Break in Exhibit Hall		
10:30 - 12:00	Protective Grounding - Continued	Cybersecurity and the Role of the Alabama Fusion Center	Understanding Stray Voltage
	Lunch		
1:00 - 2:30	Application of Voltage Regulators & Capacitors	Protocols, Standards & DNP3 Applications	Multi-Utility GIS - Huntsville Utilities
			Feeder Automation - Self Healing
2:30 - 3:00	Networking Refreshment Break in Exhibit Hall		
3:00 - 4:00	Substation Breakers	Gateways, RTU's and IED's	Grid Resiliency, Reliability, and Restoration
4:00 - 5:30	Hospitality / Exhibit Hall		

Classes are open to all attendees and exhibitors

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		Module 100	Module 200	Module 300	Module 400
Wednesday	8:30 - 10:00	Recloser & Fuse Coordination	Communication Trends in Utility Operations		NREL Project INTEGRATE
			MPLS Applications		
	10:00 - 10:30	Networking Refreshment Break in Exhibit Hall			
	10:30 - 12:00	Distribution Transformer Connections	TETRA for Utilities		EPRI Data Mining Initiative
			Cellular Routers - Use in SCADA & Distribution Automation - NERC CIP-5 Requirements		
		Lunch			
	1:00 - 2:30	System Protection	Fiber Optics Theory & Hands-On Applications		Mobile Computing Devices in Distribution Engineering
					Value of Electrical Testing of Power Transformers
2:30 - 3:00	Networking Refreshment Break				
3:00 - 4:00	Overvoltage Protection	Fiber Optics Theory & Hands-On Applications - Continued		Georgia Tech - Center of Distributed Energy	
5:00 - 6:00	Annual Dinner				
Thursday	8:30 - 10:00	High Density Coordination			
		Power Quality Issues and Solutions			
	10:00- 10:30	Networking Refreshment Break			
	10:30 - 12:00	Power Quality Issues and Solutions - Continued			
	12:00	Closing Session			

Opening Session

Ron Chebra
Enernex

Advanced Technologies Tailored for the Field Personnel

Technology innovations are now taking foothold, utility field personnel are equipped with advanced tools that can bring greater access to information, improve safety and empower the worker with knowledge to better do their job. Laptop computers have been a mainstay for the mobile workforce, but now hardened tablets and smartphones equipped with creative applications are able to directly access real-time data, giving personnel timely and accurate knowledge that can help them assess situations, diagnose root cause problems and to even allocate and order replacement assets with greater speed. These standard work tools are now being adapted to include “Augmented Reality” devices such as see-through glasses, heads-up display units, and other visualization tools that will enable workers to overlay image information while looking at the physical assets. These are unlike “Virtual Reality” headsets that only allow a user to see computer generated images. These AR tools are now being tested and used by leading utilities to help field crews rapidly assess conditions especially when they are facing areas with significant damage. Imagine being able to see images of pre-damage conditions superimposed over the live current state, accurately identify replacement assets and being able to rapidly access inventory to allocate them automatically.

Many utilities are also incorporating drones to assist in field inspections. Staff can now fly over lines, poles and other areas to gain a new perspective. Using trained and qualified staff to operate these unmanned aerial vehicles (UAV) to do close up inspection of insulators, switches and transformers can save time, reduce risks and improve the ability to diagnose and resolve problems.

The technology tools that are being used will be covered; case studies of utilities who are using these tools will be presented and areas where they have proven these benefits will be discussed.

White Hat Hacking: Full-Force Red Teaming & Tradecraft

Instructor: Jeremiah Talmantes, Red Team Security

What is Full-Force Red Teaming? Why does it make sense for many organizations, in any industry, large or small? This presentation is intended to show the process, tools, tricks and techniques that go into a full Full-Force Red Team Operation. Please join us for an interactive presentation while we walk through an Operation showing and in some cases demonstrating: door breach tools, lock picking, surveillance drones, RFID cloners, USB tools, persistent backdoor hardware, social engineering props/tactics and whatever else we can fit in the door.

Module 100 / 200: Principles & Applications of Distribution System Apparatus

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.

Application of Voltage Regulators & Capacitors

Instructor: Bob McFetridge, AMSC

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.

Substation Breakers

Instructor: Amir Zalloun, ABB

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.

Recloser Coordination

Instructor: Vincent Marec, G&W Electric Company

Covered in this class will be single and three phase reclosers. How they operate and how they are used on the distribution system. Understand how they coordinate with other devices for overcurrent protection along with key differences between electronic reclosers and hydraulic, and the pros and cons of both. Session will cover modern recloser design and controls.

Transformers Connections

Instructor: Jason Waters, 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.

System Protection

Instructor: Keith Hardt, Pungo Engineering Services

Study of power system faults and application of relays for power system protection. Covered in this class will be station protection, feeder protection

and some distribution automation schemes. Also the coordination between devices with isolation and restoration techniques.

Overvoltage Protection

Instructor: Joe Hall, Georgia Power

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.

Module 300: SCADA and Communications

SCADA Principles

Instructor: Michael Thesing, Patterson & Dewar Engineers

A Supervisory Control and Data Acquisition (SCADA) system is a proven step toward greater reliability and situational awareness of an electrical network – big or small. It also provides a firm foundation from which both basic and complex applications can grow to enable more efficient grid operation and faster recovery from problems. This session will cover the fundamental components of a modern electric utility SCADA system, industry best practices, and how the SCADA system forms the basis for Smart Grid functions.

Cybersecurity and the Role of the Alabama Fusion Center

Instructor: Mike Trotter, ALEA - Alabama Fusion Center

This session will include an overview of the Alabama Fusion Center, its various roles within the homeland security sector and specifically, what it is doing to promote proper cybersecurity practices and combat cybercrime. Mike Trotter, a criminal investigator with the Alabama Law Enforcement Agency – Alabama Fusion Center, will be presenting this block of instruction. Mike has been in law enforcement for over 25 years and is a member of the United States Secret Service, Electronic Crimes Task Force and the Federal Bureau of Investigation, Cybercrime Task Force.

Protocols, Standards, and DNP3 Applications

Instructor: Jake Brodsky, Jacobs

Protocols define the rules by which devices talk with each other, and DNP3 is a protocol for transmission of data from point A to point B using serial and IP communications. It has been used primarily by utilities such as the electric and water companies, but it functions well for other areas. This session will cover many aspects of the DNP3 protocol. Topics include certification efforts, setting timeouts, coordinating address space, counting accurately and synchronously, statistics, static vs. event polling. This session will also include a discussion on the future of the DNP3 protocol. Jake Brodsky is the current chair of the DNP3 Users Group.

RTU's, IED's, and Gateways

Instructor: Joe Boike, ACS

The class will discuss in depth the functions and applications of remote terminal units (RTU), Intelligent Electronic Devices (IED) and substation gateways.

Communication Trends in Utility Operations

Instructors: Chuck Newton, Newton-Evans

Research

Since 1978, Newton-Evans has been conducting business-to-business survey research for both multi-client and proprietary studies focused on energy industry automation, information technology, and infrastructure topics such as Smart Grid, or more appropriately, grid modernization. The latest findings from the Newton-Evans Research Company study of control systems used in the electric power industry point to heavy reliance on IP/MPLS networks for wide area communications from substations and other field locations to central site control systems. The results of this survey will be discussed in this session.

MPLS Application

Instructor: Daniel Bertovic, Georgia Transmission Corporation

Learn about how Georgia Transmission converted their frame relay communication network to a multi-protocol label switching (MPLS) network. Topics will include the project details, challenges, and best practices.

TETRA for Utilities

Instructor: Randy Shepard, Diverse Power

The presentation would include a discussion of the TETRA (Terrestrial Trunked Radio) standard. The regional radio network currently deployed in Georgia will be presented. Topics would include the use of TETRA for push to talk radio in the utility industry. Other applications include: SCADA, AVL, SMS, and email. The network has grown from a public-private partnership and currently covers approximately 50% of the state of Georgia and portions of Alabama.

Cellular Routers - Use in SCADA & Distribution Automation - NERC CIP-5 Requirements

Instructor: Mike Mount, ComNet

With the continuing growth of the Smart Grid Initiative, many utilities are looking for new approaches to connect their remotely-located facilities onto a secure and common network. With the advent of substation-rated cellular routers, it now becomes practical and cost-effective to provide a simple-to-implement, reliable, and highly secure communications network linking substation SCADA, renewable energy generation facilities, distribution automation, and remote metering to the utility's central control and monitoring center. The use of cellular routers for achieving NERC-CIP-5 compliance for new and legacy critical infrastructure will also be presented.

Fiber Optics Communication Theory & Hands-On Applications

Instructor: David Little, North Georgia Network; Robbie Young, Snapping Shoals EMC

Learn how electric utilities take advantage of the broadband capabilities of fiber optic communications to benefit electrical operation. Topics in this session will include the history of fiber optics, waveguides, types of fiber, cables, safety, splicing, designing fiber systems, testing and troubleshooting fiber. Learn how to splice and terminate fiber optic connections. This class will provide instruction on the proper techniques and tools used while allowing the students hands on experience in splicing and terminating fiber optics.

Module 400:

Engineering Topics & Emerging Technology

Grid Architecture: Discipline, Insights, and Recent Results

Instructor: Jeffrey Taft, Pacific Northwest National Laboratory

Grid Architecture is the application of systems architecture, network, theory and control engineering to the electric power grid. It provides the top level view of the whole grid; it enables reasoning about the grid's properties, behavior, and performance by focusing on structure., which sets the essential limits on what complex systems like the grid can and cannot do. Grid Architecture identifies legacy structural constraints, determines the structural changes needed to relieve these constraints and enable new capabilities, identifies platforms, informs interfaces, and shapes everything from grid communications and control to industry interactions and market products and even convergence with other infrastructure networks.

This presentation will introduce the basic concepts and approaches of Grid Architecture, followed by discussion of how it is being applied today. Finally, the presentation will describe some of the practical results of recent work and how they are being applied to deal with the issues of grid modernization, operational communications, DER integration, resilience, and cyber security, especially at the distribution level.

Understanding Stray Voltage

Instructor: Jerry Josken, UC Synergetic

This presentation will provide a thorough understanding of stray voltage. Topics will include electrical fundamentals, effects of electricity on biological objects, grounding, causes of stray voltage along with mitigating stray voltage.

Multi-Utility GIS - Huntsville Utilities

Instructor: Bill Dailey, Huntsville Utilities

Huntsville Utilities has built and maintains a multi-participant GIS system that serves the Gas, Water, Electric and Fibers departments within the company (both engineering and operations). The utility also perform in-house orthophoto base mapping

conversions with the actual costs being shared with other government entities within the county. Discussion will also include how the utility will be providing fiber to the home.

Feeder Automation - Self Healing

Instructor: James Layton, Carroll EMC

Carroll EMC began deploying a feeder automation system in 2013. This presentation will provide an overview of the project to date and will cover best practices found by the utility.

Grid Resiliency, Reliability, and Restoration

Instructor: John Eddins, Theorem Geo

Associates

This session will be discussing Theorem Geo's Storm Suite tool. Theorem Geo has developed a software suite that will help utilities more quickly, safely and efficiently predict, plan and manage storm preparation and response. They have a desktop platform that can do weather analytics and modeling that a utility management team would use along with various apps to help the utility select the best staging sites, get the right people to their places and coordinate the activities once they begin the restoration efforts. Based on actions on the desktop, responders with the storm cell applications can more safely and efficiently get the right people to the right places while analyzing their environments in real time to best ensure their safety.

NREL Project INTEGRATE

Instructor: Shailendra Grover, OMNETRIC Group

The U.S. Energy Department's National Renewable Energy Laboratory's (NREL) Project INTEGRATE is an initiative aimed at resolving the current constraints utilities face when integrating distributed general assets including renewable energy sources into the grid. NREL's Project INTEGRATE brings together CPS Energy, Duke Energy and The University of Texas at San Antonio with OMNETRIC Group and Siemens to advance the integration of large-scale, renewable, clean energy resources into the grid. Working with OMNETRIC Group and Siemens, CPS Energy installed a microgrid solution at the Joint Base San Antonio's Fort Sam Houston military post consisting of a 20 kilowatt solar PV array, 48 kilowatt hour battery, a weather station, and a Siemens microgrid controller. Demonstration tests at CPS Energy showed improved control of the new microgrid under live conditions, which enables renewable resources to be integrated more predictably.

EPRI Distribution Modernization Demonstration Data Mining Initiative

Instructor: Jared Green, EPRI

The Distribution Data Mining Initiative is intended to validate solutions to some of the key data challenges faced by distribution system and power delivery service providers. Its purpose is to leverage collaboration between EPRI, electric service providers, and data solutions providers, including both academia and data analytics companies. The initiative members will provide real power system

datasets and supporting information to the data repository. The enhanced partnerships established as part of this initiative will foster a better understanding of industry needs, capture leading data analytic practices, transfer knowledge from industry experts, and accelerate ideas (solutions) to the market.

Applications of Mobile Computing Devices in Distribution Engineering

Instructor: Brad Baugh, Alabama Power

Covering the basics of the current generation of mobile computing devices, with an emphasis on Apple iPads, and their potential applications for engineers. Discussion of apps and accessories that are available commercially, as well as the current state of the development of business apps for power distribution.

Understanding the Value of Electrical Testing for Power Transformers

Instructor: Charles Sweetser, OMICRON

This presentation focuses on how diagnostic techniques can be applied to power transformers as part of the standard condition assessment protocol. The audience will be provided with an understanding, application, and analysis of these tests, supported by specially selected case studies validating the value that these diagnostic tests bring to testing, and finally assessing, power transformers.

Georgia Tech - Center for Distributed Energy

Instructor: Deepak Divan, Georgia Tech

The Center for Distributed Energy (CDE) has been established at Georgia Tech to do advanced research and to develop technologies and holistic solutions that can transform electricity delivery and utilization. Research areas include power conversion, industrial applications, energy conservation, distributed energy resources, distributed control of the grid, security and communications in energy, as well as microgrids, dc nanogrids and energy access for emerging markets. CDE partners include utilities, industry, manufacturers, research organizations, start-ups, VCs and other academic institutions with interests in aligned areas. In addition to doing traditional forward-looking cutting-edge academic research, CDE is uniquely focused on accelerating and de-risking technologies so that they can see faster adoption and higher impact.

consolidate multiple services onto a single fiber transport network. This technology reduces costs and infrastructure while increasing bandwidth. Also a discussion on APC installing reclosers as both switches and reclosers.

Power Quality Issues and Solutions

Instructors: Pat Coleman, Don Chancy, Alabama Power

This class will provide an introduction to power quality. We 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.

Closing Session

High Density Coordination

Instructors: Bob Cheney, Alabama Power

This session will be a discussion about the high density coordination projects at Alabama Power Company (APC). The utility is using a Gigabit Passive Optical Network (GPON) to coordinate as many as 14 reclosers using mirror bits for blocking. The recloser control will transmit mirror bits across the network in three cycles, thus allowing reclosers to send blocking signals to neighboring reclosers. GPON gives the end user the ability to