Southeastern Distribution Apparatus School and Conference

August 19th - 22nd, 2019

The Hotel at Auburn University and Dixon Conference Center
Auburn, Alabama

Utility Technology Association is a 501c(6) non-profit organization dedicated to the delivery of high quality, practical and comprehensive training designed to meet the needs and challenges of today’s electric utility industry. The organization is referenced as Utility Technology Education in all event promotional and program advertising medium.
General Information
The 2019 Southeastern Distribution Apparatus School and Conference is sponsored by Utility Technology Education. The conference will be held August 19th - 22nd. The conference provides a forum for electric utility technicians, engineers and managers involved in distribution, telecommunication, substation and apparatus departments to obtain high quality, practical, and comprehensive training.

The conference is divided into concurrent modules to better provide instruction for utility professionals at all levels of experience. The courses are designed for participants to select topics they require or have an interest in.

Utility Technology Education programs are unique because they are designed and taught by experts in the utility field. Instructors come from a wide-range of backgrounds including electric utilities, equipment manufacturers and consulting engineering firms.

One Day Participant Program
This provides an opportunity for management (general managers, purchasing agents, operation managers, engineers, etc.) to attend one day for a reduced charge. Come on any day and attend a few classes, then enjoy an evening of hospitality in the Exhibit Hall.

Professional Development Hours
The Southeastern Distribution Apparatus School and Conference will award 18 professional development hours to participants attending the entire school.

Location
The Hotel at Auburn University and Dixon Conference Center is centrally located three miles from Interstate 85 in Auburn, Alabama. The Hotel at Auburn University is situated in a charming university campus environment within easy walking distance to many shops and restaurants in the quaint, historical downtown Auburn, Alabama. Find out more about the hotel and location at www.auhcc.com.

The Hotel at Auburn University
241 South College Street
Auburn, Alabama 36830

Atlanta to Auburn (110 miles)
Birmingham to Auburn (120 miles)

Hotel Accommodations
A block of rooms has been reserved for attendees at the Hotel at Auburn University. Reservations can be made through the hotel by phone at (800) 228-2876. Since rooms are limited, please make your reservations by August 5th to ensure availability. The special room rate is $142.00 plus tax. Be sure to identify yourself as being with the Southeastern Distribution Apparatus School for the group rate.

Group Code: 190818APPA

Exhibit Hall
The Exhibit Hall will be open Monday through Wednesday. All the suppliers you need to meet will be in one place to answer your questions and demonstrate their products.

Registration
Registration for the Southeastern Distribution Apparatus School & Conference can be sent by mail or on-line. Payment can be made with check, purchase order, or credit card. Invoicing available upon request. Credit Card payment is only accepted with on-line registration.

Student Registration
Student Participant Fee includes Registration, Conference Notebook, Lunch on Tuesday and Wednesday, Dinner on Wednesday, and Admission to the Exhibit Hall.

One-Day Student Registration
Student One-Day Participant Fee includes Registration, Conference Notebook, one Lunch, and Admission to the Exhibit Hall.

Registration Fee
Student $ 425
One Day Only Student $ 245
Displaying Exhibitor $ 575
Hosting Exhibitor $ 375
Additional Exhibitor $ 245
Presenters No Charge

Pre-Registration by August 5th. Late and On Site Registration are subject to an Additional Charge of $50.

Register On-Line
www.utilitytech.org

Cancellation Policy
Refunds, less a $50 administrative fee, will be made for all cancellations received in writing before August 5th, 2019. No refunds will be made after that date. Only attendee substitution after that date.

Annual Dinner & Casino Royale
There will be a School Dinner on Wednesday evening. After dinner, enjoy an evening at the Casino Royale in the Ballroom.

Four Modules of Classes

Module 100: Fundamentals of Distribution System Apparatus
Coordinators: Freddy Morgan, City of Covington; Lonnie Whitley, Satilla REMC; John Moore, Coweta-Fayette EMC
This module provides instruction in basic distribution apparatus theory and application. Students will learn electrical fundamentals and power theory along with how the equipment works. This session should be attended by those who need to gain a better understanding of the components in an electrical distribution system. This module will help the student establish a good foundation for future classes.

Module 200: Principles & Applications of Distribution System Apparatus
Coordinators: Scott Johnson, Georgia Power; Joe Hall, Pike Engineering
Module providing a more in-depth look of the individual distribution apparatus equipment used in the substation and on the distribution feeders. The sessions will emphasize why the equipment is used and how the equipment functions. Distribution equipment included in sessions will be regulators, breakers, transformers, capacitors, arresters, switchgear and reclosers along with classes on system protection.

Module 300: SCADA and Communications
Coordinators: Mary Hester, Intelligent System Solutions; Nicole Sullivan, Patterson & Dewar Engineers; Robbie Young, Snapping Shoals EMC
This module provides instruction on the principles and equipment of a Power System SCADA system used for the monitoring and control of an electrical distribution system. Includes sessions on Cybersecurity, Fiber Optic Communications, IDMS Advanced Applications, NERC Overview, and Automated Restoration Systems.

Module 400: Smart Grid, Engineering & Emerging Technology
Coordinators: Brian Chandler, City of Troy Utilities; Darren Crews, Okefenoke REMC; Bob Cheney, George Dobbins, Alabama Power
This module will examine the initiatives and engineering applications of electric utilities. Session topics will include Planning & Management of Today’s Grid, Distribution Automation Schemes, 5G and Utility Infrastructure, Lightning Surge Protection, Power Electronics, and Utility Broadband Applications. Also will be an in-depth discussion on Power Quality issues and solutions of the electrical distribution system.

Exhibit Hall
Coordinators: Jack Kelley, Tri-State Utility Products; Chip Kanour, Utility Specialists, Inc.; Chris Crawford, Superior Power Products

Contact Information
Utility Technology Association
Suzanne Powell
(770) 519-1676 | suzanne@utilitytech.org
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<td>Electrical Fundamentals &amp; Power Theory</td>
<td>Protective Grounding</td>
<td>Power System SCADA and Smart Grids</td>
<td>EPRI - Planning &amp; Management of Today’s Grid</td>
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<td>Power System SCADA and Smart Grids - Continued</td>
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<td>Substation &amp; Distribution Equipment Overview</td>
<td>Underground Switchgear</td>
<td>Automated Restoration Systems - Utility Roundtable</td>
<td>Three Phase Primary Injection</td>
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<td>System Protection</td>
<td>Fiber Optics Communication</td>
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<td>Fundamentals of Distribution Feeder Protection</td>
<td>Applications of Voltage Regulators &amp; Capacitors</td>
<td>Fiber Optics Communication</td>
<td>Distribution Automation Coordination Schemes</td>
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<td>Reclouser Applications</td>
<td>IDMS Advanced Applications</td>
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<td>Underground Cable &amp; Cable Accessories</td>
<td>Overvoltage Protection</td>
<td>Cyber-Terrorism Defense - Protecting Our Nations Critical Infrastructure</td>
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<td>8:30 - 9:15</td>
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<td>9:15 - 10:15</td>
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<td>10:30 - 11:30</td>
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In 2010, EPB Power and Fiber Optics served its customers and surprised the nation by becoming the first provider in the U.S. to launch Gig speed internet (1,000 Mbps) and make it accessible to every home and business in Chattanooga and surrounding areas utilizing a community-wide fiber optics network.

EPB followed up by using its lightning-fast network to better serve its customers by deploying the most advanced and highly automated smart grid power management system in the nation. In the process, EPB became the first major power distribution utility to earn the U.S. Green Building Council’s PEER certification for having a highly automated, modernized electric power grid. Since then, EPB has managed its smart grid to optimize service to its customers by reducing power outages by more than 50%. EPB also serves as a primary partner for the U.S. Department of Energy and Oak Ridge National Laboratory in field testing new technologies and developing best practices for other communities that deploy smart grid infrastructure.

**Telecommunications: The Opportunities & Challenges Linking Field Assets to the Operations Center**
**Instructor: Ron Chebra, Enernex**

Today everything is being connected. The explosion of multi-purpose sensors and a plethora of actuators that can control virtually anything has been termed the Internet of Things (IoT) to highlight the value of interconnectedness. In the utility space, telecommunications has been a foundational core of distribution automation, linking field devices and apparatus to the distribution control center and SCADA. Applying the concept of IoT to the Grid to form a Grid of Things (GoT) introduces great potential for varying levels of autonomy. Modern-day reclosers frequently use data from neighboring assets to adjust their operational schemes in this manner. As the number and diversity of sensors in the grid expand, including both utility-owned and customer-owned devices, the potential for even greater levels of local field derived intelligent action hold great potential. However, this potential also expands the areas of possible risks. Some of these risks include personnel safety, cyber threat surfaces and a reliance on secure and reliable communications networks.

During this session, we will explore the growth of sensors in the home, industrial environment and the grid and examine the potential of harmonizing these for greater awareness and optimization. The communications networks that link these together are key; this session will examine the use of digital cellular, private wired and wireless networks and AMI mesh networks to perform these functions highlighting the functionality of these and the capabilities to support the Grid of Things. The session will also examine the operational systems needed to manage the tsunami of field sensor data and to effectively control assets. Finally key aspects of cyber protection will be highlighted in this session to identify the strategic necessity to consider this before deployment of any technologies.

**Module 100: Fundamentals of Distribution System Apparatus**

**Instructor: Mike Chirico, South Alabama Electric Cooperative**

Session on 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 & Distribution Equipment Overview**

**Instructor: Keith Hartd, Pungo Engineering Services**

Get an overview of key substation and distribution equipment such as: power transformer, breakers, batteries, reactors & voltage regulators, capacitors, fuses, reclosers and lightning arrestors. This class will show how equipment works and coordinates together. It will give a high level understanding of how a substation works and how the distribution system works as a whole.

**Voltage Regulators**

**Instructor: Randall Lawrence, Eaton**

Session will center on how a regulator works and the internal components. Covers how they are used in distribution systems along with basic operation & functions. Covers safety issues such as by-passing & deenergizing regulators. Basic inspection procedures.

**Fundamentals of Distribution Feeder Protection**

**Instructor: Craig Wester, GE Grid Solutions**

Session 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.

**Distribution Transformer Connections**

**Instructors: Jason Waters, Mike McHan, 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.
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.

Recloser Applications
Instructor: Willaim Craig, Hubbell Utility Solutions
Covered in this session will be single and three phase reclosers. How they operate and how they are used on the distribution system. Helps you understand how they coordinate with other devices such as station relays and fuses. Helps you understand key differences between electronic reclosers and hydraulic, and the pros and cons of both.

Overvoltage Protection
Instructor: Joe Hall, Pike Engineering
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.

SCADA and Communications
Power System SCADA and Smart Grids
Instructor: Michael Thesing, Patterson & Dewar Engineers
Session begins with a brief history of electrical power utility SCADA as well as its use in other industries. All the basic system building blocks are then presented starting with intelligent electronic devices (IEDs), data concentrators, communication links, and master stations. The class includes considerations when building a SCADA system such as budgeting, cost justification, user expectations, staffing, test and commissioning, training, and maintainability. Diving deeper into the system, the fundamentals of SCADA communication will be discussed including protocols, channel types, and cloud services. System design aspects will be described including alarm management, HMI design, integration with our smart grid applications, and time synchronization. Finally, the class will touch on important security considerations. Throughout the talk, the presenter will interject industry best practices and examples from project implementations. Questions and sharing of past experiences are highly encouraged by all attendees.

Automated Restoration Systems - Utility Roundtable
Instructors: Robbie Young, Snapping Shoals; Barry Stephens, Georgia Power; Chip Stephens, Carroll EMC; Wayne Gossage, Jefferson Energy Cooperative; Reed Wells, Flint Energies
Session will include a panel of utility professionals sharing key insights about the automated restoration designs in operation at their utility. The discussion will include the theory of operation of each system, challenges faced during implementation and operation, equipment used, and benefits realized. Comparisons of centralized vs decentralized systems as well as hybrid systems will be discussed.

NERC Overview
Instructor: Fred Raines, SERC Reliability Corporation
In August, 2003, North America experienced its worst blackout in history with over 50 million people losing power in the Northeastern and Midwestern United States and Ontario, Canada. In response, the United States Congress passed the Energy Policy Act of 2005 which created an Electric Reliability Organization (ERO) that enforces mandatory electric reliability rules on all users, owners, and operators of the nation’s bulk power system. In this session, learn about the ERO and the role electric distribution systems play in maintaining reliability of the electric grid.

Fiber Optics Communication Theory & Hands-On Applications
Instructor: David Little, NGN Connect
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.

IDMS Advanced Applications
Instructor: Matthew Leak, Alabama Power
Distribution Automation is a foundational technology that will facilitate the attainment of the Smart Distribution Grid goals. The transition to the next generation operating system, i.e. the Integrated Distribution Management System (IDMS), leverages the Distribution Automation deployment and provides for improved operating capabilities using advanced applications. Alabama Power is beginning to reap more benefits of an Integrated Distribution Management System with the implementation of the advanced applications: Distribution Power Flow (DPF), Fault Location (FL), and Fault Isolation and Service Restoration (FISR). The notion of a smart distribution grid is being realized with these applications.

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.

Module 300:
SCADA and Communications

Module 400:
Smart Grid, Engineering & Emerging Technology
EPRI - Planning & Management of Today’s Grid
Instructor: Alex Melhorn, EPRI
The distribution system is changing at an ever-rapid pace. Distribution systems have been designed for one purpose: reliably serve all customers in a safe and cost-effective manner. However, in this new era additional objectives must be considered as well including integrating Distributed Energy Resources (DER) cost-effectively, utilizing DER as non-wires solutions, increasing resiliency, improving operational efficiency, and actively using distribution systems to provide bulk system services. Grid modernization efforts are underway throughout the industry to achieve these goals. Currently in the US, the connection of DER to the distribution system is controlled through fixed interconnection agreements supported by planning studies that determine if distribution system upgrades or size limitations are required. In other parts of the world, the desire for increased DER generation has resulted in flexible interconnection agreements. With flexible DER connections, the characteristics of the DER must be managed to keep power quality indices within the established limits. This presentation will highlight the impact flexible interconnection agreements might have on the Distribution System Operator (DSO) including the tools the DSO will need to balance the competing interest of all the stakeholders.

The Life Cycle of Electrical Equipment
Instructors: Ramon Benedict, Shannon Wright, Emerald Transformer
Session will discuss the complete life cycle of substation equipment including: transformers, regulators and reclosers. This session will include buying new vs. repairing, best practices for preventative maintenance, field and plant repair, and decommissioning of failed and unused electrical equipment. Also discussed will be what to do with PCB contaminated equipment.
Using Power Electronics to Increase Solar Hosting Capacity  
**Instructor: Bob McFetridge, AMSC**  
Many utilities are adding solar farms to their distribution circuits and noticing several concerning conditions. First, the number of operations on mechanical equipment (load tap changers, line regulators, switched capacitor banks) is rapidly increasing while the Operations and Maintenance budgets are decreasing. The variability of the solar farm output is causing more voltage fluctuations on the circuit thus increasing the number of operations to correct these fluctuations. Secondly, these voltage fluctuations are causing issues for other customers on the feeder circuit, thus limiting the amount of solar that can be added to a given feeder. With the addition of power-electronics based voltage regulation, the voltage can be maintained on the circuit with very high speed (less than 2-cycles) response and using a device that has no maintenance requirements and unlimited number of operations. The device can also further reduce line losses and increase the amount of voltage reduction that can be performed on the feeder. Finally, the device can operate on a per phase basis and thus help reduce the amount of voltage imbalance or Var imbalance between the phases.

### Three Phase Primary Injection / Passing Current through the Transformer  
**Instructor: John Musgrove, SMC**  
Many applications exist for three phase primary injection from commissioning substations to motor protection relays. Homemade devices are on the outs due to safety and three phase generators create a lot of voltage but not enough current. This class will discuss a compact powerful system that eliminates the need for those devices. The session will include a demonstration of the system in action at customer locations along with the capabilities. Thanks to KAMO Power it is now possible to pass current through an 84 MV A transformer. The goal was to pass current from the transformer primary side to the secondary side to check polarity & ratio of the current transformer circuit.

### Proper Arrester Applications Improve Reliability  
**Instructor: Randall Lawrence, Eaton**  
All the money being spent on automation and reliability can appear wasted if lighting outages take out that equipment. Can lightning impulse outages be eliminated? Find out how to achieve the best protection on your most important and high dollar assets. This session focuses on teaching the basics of how an arrester design can mitigate and remove lightning surges from the system that could cause breaker operations; additionally, how the construction design and methods of applying arresters can either add to lighting induced breaker outages or help to eliminate those outages. This class talks to both engineers that specify arresters and design construction standards, as well as line crews building to those specifications. Each decision made can impact your reliability goals.

### Active Distribution Devices in Loop Schemes  
**Instructor: Jerry Josken, Pike Engineering**  
The demand to provide higher reliability has driven electric utilities to employ automatic reconfiguration in areas where adjacent distribution circuits are available. Engineers struggle with the utilization of active devices on the main trunk circuits when power flow is reversed. Adverse weather conditions can impose several faults on a circuit. Coordination schemes are ineffective if the control operating parameters are not changed to account for a reverse flow of power. Circuit reconfiguration can remain in place for hours, days or longer. Voltage regulators should be operable for extended periods. This session will examine what measures can be taken to maximize reliability and power quality during alternate feed scenarios.

### Transformer Turns Ratio Test: Beyond the Basic Facts  
**Instructor: Daniel Carreno, Megger**  
Transformer Turns Ratio (TTR) is one of the most common tests used to assess the condition of a transformer’s core and windings. It is performed as a part of manufacturing, acceptance, maintenance and troubleshooting test procedures to determine problems due to poor design, assembly, handling, overloading, fault conditions, or neglect. TTR results are compared against the nameplate ratings to detect loose connections, shorted turns, broken strands, winding deformation, tap changer contact problems, and any other core and windings deficiencies. Several factors associated with the method used for testing will directly impact the TTR readings. While sometimes overlooked, a better understanding of these factors can help any individual find the root cause of readings that exceed acceptable limits dictated by international standards. These factors include: test voltages, step-up or step-down excitation, and the effects of single-phase versus three-phase excitation (when testing three-phase transformers). This session will use field test results and case studies to illustrate and explain the effects of the aforementioned factors during TTR testing.

### Distribution Automation Coordination Schemes  
**Instructor: Matt Edmondson, Schweitzer Engineering Lab**  
Effective distribution automation improves the reliability of power distribution systems. But no two distribution feeders are exactly the same. Distribution engineers may need a range of automated coordination solutions, from simple to sophisticated, to optimally cover all the areas of their distribution system. This session will address several automated coordination schemes that are commonly used today. Learn about load transfer schemes, loop sectionalizing schemes, and centralized automatic restoration solutions.

### SMC  
A discussion of the various approaches used by electric utilities pursuing broadband deployments, lessons learned, and a description of Huntsville Utilities’ innovative partnership with Google Fiber.

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**Closing Session**

**Instructor: Viet-Minh Tong, ABB**  
Session will discuss underground solid dielectric switchgear technology. The session will include an introduction on the applications of underground switchgear. Discussion on the different existing switchgear technologies and their design principles. Moreover, it will focus on solid dielectric and vacuum technology features and benefits pertaining to switchgear.

**Instructor: Wes Kelley, Huntsville Utilities**  
A discussion of the various approaches used by electric utilities pursuing broadband deployments, lessons learned, and a description of Huntsville Utilities’ innovative partnership with Google Fiber.
# Student & Presenter Registration Form

Southeastern Distribution Apparatus School & Conference  
August 19th - 22nd, 2019  
The Hotel at Auburn University,  Auburn, Alabama

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## Registration Fees

- **$425** **Student** - Fee includes Conference Notebook, Lunch on Tuesday and Wednesday, Dinner on Wednesday, Networking / Hospitality Breaks, and Admission to Exhibit Hall.

- **$245** **One Day Student** - Fee includes Conference Notebook, Lunch on one day, Networking / Hospitality Breaks, and Admission to Exhibit Hall.

- **N/C** **Presenter** - No Charge - All Presenters Must Register

### Total Payment

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Register by August 5th, 2019

Late and Onsite Registration are subject to an additional charge of $50.

Register On-Line at [www.utilitytech.org](http://www.utilitytech.org)

## Payment

Check payable to **Utility Technology Association** enclosed for $\text{______}

Please Invoice \text{______}  

Purchase Order Number \text{______}  

Credit Card Payments accepted only with On-Line Registration (VISA, MasterCard, and American Express)

## Return Registration Form To

Utility Technology Education  
Suzanne Powell  
4711 Peachtree Industrial Blvd, Suite 100  
Lake Berkeley, Georgia 30092

Please email questions to suzanne@utilitytech.org  or  contact Suzanne Powell at (770) 519-1676

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## About Utility Technology Education

Utility Technology Education is a non-profit organization dedicated to the delivery of high quality, practical and comprehensive training designed to meet the needs and challenges of today’s electric utility industry.

Utility Technology Education’s educational programs are unique because they are designed and taught by experts in the utility field. Instructors come from a wide-range of backgrounds including electric utilities, equipment manufacturers and consulting engineering firms.

## One Day Participant Program

An opportunity is provided for management (general managers, purchasing agents, operations managers, engineers, etc.) to attend one day for a reduced fee. Come on any day and attend a few classes, then enjoy an evening of hospitality in the Exhibit Hall. Lunch is provided for Day Participants.

## Cancellations

Notification of cancellation must be submitted in writing to:

Utility Technology Education  
4711 Peachtree Industrial Blvd  
Suite 100  
Lake Berkeley, Georgia 30092

Refunds, less a $50 administrative fee, will be made for all cancellations received in writing before August 5th, 2019. No refunds will be made after that date. A substitution of attendees may be made by notifying Utility Technology Education prior to the conference.