

**Can't Travel? Attend Remotely via Video Conference!**

We use Microsoft Teams as our platform for remote connections. You do not need to have a Teams account in order to participate remotely. You may join the meeting through your web browser or by downloading and installing the Teams app. You will have the ability to ask questions through the microphone on your computer, or by typing a question into the chat box



# ELECTRIC DISTRIBUTION GROUNDING & STRAY VOLTAGE

**March 25-26, 2020  
Hyatt Regency New Orleans  
New Orleans, LA**



*"EUCI organized and coordinated a training class that was well put together and focused on attendees and content."*

Electric Utility Engineer III, City of Tallahassee



**TAG US #EUCI  
FOLLOW US @EUCIEvents**



EUCI is authorized by IACET to offer 1.1 CEUs for the course

## OVERVIEW

The electric distribution ground system is a complex network of various paths and accommodates the return current back to the substation. Ohm's Law tells us that any current passing through an impedance creates a voltage. If we acknowledge that the ground path(s) is not a perfect conductor, we know that stray voltage is inevitable.

This course provides insight into the workings of the grounding system from the end user back to the substation. Attendees learn the causes of high ground currents, how they can be minimized, and the techniques to mitigating stray voltage.

## LEARNING OUTCOMES

- Review the basic electrical formulas associated with grounding and stray voltage
- Identify how transient events create hazards which may be dangerous to the public and utility personnel, as well as damage equipment
- Review Section 9 of the National Electric Safety Code and discuss acceptable grounding methods
- Review the definitions of commonly used terms such as "effectively grounded" and "bonded"
- Identify ground resistance measurement for both substations and the distribution system
- Assess the effects of electricity on biological objects (animals and human beings)
- Review the definition of stray voltage
- Discuss stray voltage trouble shooting and mitigation techniques
- Review various stray voltage scenarios

## WHO SHOULD ATTEND

Electric Engineering professionals and technicians seeking a contemporary overview of distribution grounding practices and stray voltage issues.

**“Very informative class, enjoyed it!”**  
Lineman, City of Tallahassee

**“Kept the class engaged and interesting.”**  
Global Electrical Engineer, Vadata

**“They did a really good job explaining a difficult topic.”**  
District Engineer, Baldwin EMC

# AGENDA

---

WEDNESDAY, MARCH 25, 2020

**8:00 – 8:30 am                      Registration & Continental Breakfast**

**8:30 am – 5:00 pm                Course Timing**

**12:00 – 1:00 pm                 Group Luncheon**

Engineering Formulas Relevant to Grounding

- Ohm’s Law
- Kirchhoff’s Voltage and Current Laws
- Alternating Current
- Impedance Model
- Three Phase Power Systems

Transient Event on the Distribution System

- Lightning Events
  - o Surge Arrester Operation
- Line to Ground Faults
  - o Temporary Over Voltage (TOV)

Grounding Methods

- NESC 2017 Section 9
  - o Point of Connection
  - o Method of Connection
  - o Grounding Electrodes
  - o Separation of Ground Conductors

Grounding Definitions

- Effectively Grounded – Per NEC
- Bonded – Per NEC
- Step/Touch

Common Grounding Practices

- Distribution System
  - o Ground Resistance Measurements
    - Earth Ground Clamp Meters
- Substation
  - o Ground Grids
    - Soil Resistivity

Effects of Electricity on Biological Objects

- Humans
- Animals
- Threshold of Perception
- Threshold of Fatality

# AGENDA

THURSDAY, MARCH 26, 2020

**8:00 – 8:30 am**      **Continental Breakfast**

**8:30 am – 12:00 pm**      **Course Timing**

**Stray Voltage Definition**

- Per IEEE Working Group 1695
- Stray Voltage vs. Contact Voltage
- Influential Factors on Stray Voltage

**Stray Voltage Mitigation Techniques**

- Phase Balancing
- Power Capacitor Bank Issues
- Deteriorated Neutrals
- Neutral Isolators

**Stray Voltage Scenarios**

- Swimming Pools
- Shower and Faucets
- Farms
- Fences and Gates
- Marina and Boat Docks



*“Both speakers are excellent and keep the topics interesting throughout the day.”*

Principal Electrical Engineer,  
Amazon

# INSTRUCTORS



## Jerry Josken

**Senior Consultant, Pike Engineering**

Jerry holds a BS in Electrical Engineering Technology from the Milwaukee School of Engineering and a MBA from North Central College. During his 30+ year career with Eaton’s Cooper Power Systems, Jerry served in a variety of engineering capacities. Past leadership positions include Chair of IEEE Rural Electric Power Conference (2012) and GLEMS Distribution Equipment /Controls (2013-2014). Presently, Jerry coordinates Pike Engineering Professional Development Program.



## John Gajda, PE

**Engineering Manager, Pike Engineering**

John holds BS and MS degrees in Electrical Engineering from the University of Arkansas and NC State, respectively. His 30 years of technical experience have been focused in the areas of distribution capacity and reliability planning, protection, and generator interconnections. In recent years John served as Director of DER Technical Standards at Duke Energy; while there he served as the primary author of Duke Energy’s “DER Method of Service Guidelines,” a planning guideline for DER on the T&D system. John is also a frequent guest lecturer at NC State University.

## IACET CREDITS

---



EUCI has been accredited as an Authorized Provider by the International Association for Continuing Education and Training (IACET). In obtaining this accreditation, EUCI has demonstrated that it complies with the AN-SI/IACET Standard which is recognized internationally as a standard of good practice. As a result of their Authorized Provider status, EUCI is authorized to offer IACET CEUs for its programs that qualify under the AN-SI/IACET Standard.

**EUCI is authorized by IACET to offer 1.1 CEUs for the course.**

## REQUIREMENTS FOR SUCCESSFUL COMPLETION

---

Participants must sign in/out each day and be in attendance for the entirety of the course to be eligible for continuing education credit.

## INSTRUCTIONAL METHODS

---

PowerPoint presentations, interactive group exercise, and group discussion will be used during this course.

## EVENT LOCATION

---

A room block has been reserved at the **Hyatt Regency New Orleans**, 601 Loyola Ave, New Orleans, LA 70113, for the nights of March 24-26, 2020. Room rates are US \$209 plus applicable tax. Call **504-561-1234** for reservations and mention the EUCI event to get the group rate. The cutoff date to receive the group rate is February 24, 2020 but as there are a limited number of rooms available at this rate, the room block may close sooner. ***Please make your reservations early.***

## REGISTER 3, SEND THE 4TH FREE

---

Any organization wishing to send multiple attendees to this course may send 1 FREE for every 3 delegates registered. **Please note that all registrations must be made at the same time to qualify.**

To Register Click Here, or

**Mail Directly To:**

PMA Conference Management  
PO Box 2303  
Falls Church VA 22042  
201 871 0474  
Fax 253 663 7224  
register@pmaconference.com

## EVENT LOCATION

A room block has been reserved at the **Hyatt Regency New Orleans**, 601 Loyola Ave, New Orleans, LA 70113, for the nights of March 24-26, 2020. Room rates are US \$209 plus applicable tax. Call **504-561-1234** for reservations and mention the EUCI event to get the group rate. The cutoff date to receive the group rate is February 24, 2020 but as there are a limited number of rooms available at this rate, the room block may close sooner. **Please make your reservations early.**

## PLEASE REGISTER

**ELECTRIC DISTRIBUTION GROUNDING & STRAY VOLTAGE COURSE**

MARCH 25-26, 2020: US \$1395

EARLY BIRD on or before MARCH 6, 2020: US \$1195

## ENERGIZE WEEKLY

Energize Weekly is EUCI's free weekly newsletter, delivered to your inbox every Wednesday. We provide you with the latest industry news as well as in-depth analysis from our own team of experts. Subscribers also receive free downloadable presentations from our past events.

Sign me up for Energize Weekly

How did you hear about this event? (direct e-mail, colleague, speaker(s), etc.)

Print Name

Job Title

Company

What name do you prefer on your name badge?

Address

City

State/Province

Zip/Postal Code

Country

Phone

Email

List any dietary or accessibility needs here

### CREDIT CARD INFORMATION

Name on Card

Billing Address

Account Number

Billing City

Billing State

Exp. Date

Security Code (last 3 digits on the back of Visa and MC or 4 digits on front of AmEx)

Billing Zip Code/Postal Code

**OR** Enclosed is a check for \$ \_\_\_\_\_ to cover \_\_\_\_\_ registrations.

### Substitutions & Cancellations

Your registration may be transferred to a member of your organization up to 24 hours in advance of the event. Cancellations must be received on or before February 21, 2020 in order to be refunded and will be subject to a US \$195.00 processing fee per registrant. No refunds will be made after this date. Cancellations received after this date will create a credit of the tuition (less processing fee) good toward any other EUCI event. This credit will be good for six months from the cancellation date. In the event of non-attendance, all registration fees will be forfeited. In case of course cancellation, EUCI's liability is limited to refund of the event registration fee only. For more information regarding administrative policies, such as complaints and refunds, please contact our offices. EUCI reserves the right to alter this program without prior notice.