



**Electric Cooperatives  
of Arkansas**

*Your Local Energy Partners*

*presents..*

## **Distribution Overcurrent Protection Course**

November 12 – 14, 2018

Little Rock, Arkansas

### ***What is this course about?***

This course focuses on the application of protective devices for electric distribution systems including device coordination, reach, location, and selection, with the goal of maximizing system reliability. The training will utilize practical examples to reinforce the classroom concepts. Pike Engineering training is vendor-neutral and focused on the technical engineering protection issues, not any specific manufacturer's equipment or device. The course includes the following:

- Review of modern distribution system overcurrent protection and sectionalizing practices
- Overview of fault calculations, impedance, and the per-unit system
- The impact of system design, equipment selection, and protection practices

It is recommended for attendees to bring an engineering calculator to class. Smart phones with scientific calculator function would also serve this purpose.

### ***Who should attend?***

Distribution engineering and technical personnel of any experience level who desire to gain a better understanding of distribution system protection or need a review of protection and sectionalizing practices. Anyone seeking an overview of contemporary protection practices and a review of calculations used to compute fault currents and reliability impacts will find this course helpful.

### ***Professional Development Hours***

Upon completion, attendees will receive a certificate for 17 Professional Development Hours (PDH). Pike Engineering is registered as continuing education providers with Board of Professional Engineer in Florida and North Carolina. Pike Engineering courses have never be rejected as continuing education by any state professional engineering board.

### ***Instructor Bios:***

**Willis Edmondson** conducts a variety of studies in the Pike Engineering System Planning and Grid Analytics group. Willis received a BS in Electrical Engineering and an MS in Electric Power System Engineering from NC State University. His specializations include distribution system modeling, load flow analysis, protection, and electromagnetic transient analysis. Willis' experience with distributed generation projects range from small net-metering customers, utility scale solar projects to 100+ MW wind energy facilities. His prior experience includes NERC regulatory compliance specialist for power generation facilities and National Science Foundation Engineering Research Center developing energy storage devices.

**Jerry Josken** is a Senior Consultant for Pike Engineering. Jerry holds a BS in Electrical Engineering Technology from the Milwaukee School of Engineer and a MBA from North Central College. During his 30+ year career with Eaton's Cooper Power Systems Jerry has served as Test Engineer, Design Engineer, Distribution Protection Engineer and Field Application Engineer. 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 Programs.





# Distribution Overcurrent Protection

## Course Outline

**Classes will be held from 8:30am- 4:00pm Monday & Tuesday, 8:30am to noon Wednesday**

### ***Distribution Protection Fundamentals***

- Distribution Systems
- Types of Faults
- Selective Coordination
- Protection Zones and Reach
- Minimizing Customer Impact
  
- Symmetrical Components Review
- Fault Current Calculations
- Time-Current Characteristic Curves

### ***Protective Equipment & Characteristics***

- Load and Interrupting Ratings
- Fuses
  - Minimum Melt/Total Clear
  - Expulsion/Current Limiting Fuses
- Reclosers
  - Dual Timing Characteristics
  - Hydraulic and Electronic
  - Control Settings and Types
- Relay-Controlled Circuit Breakers
  - Types of Breakers
  - Electromechanical Relays
  - Microprocessor-based Relays
  - Phase and Ground Relays
- Sectionalizers
  - How they operate
  - Applications
  - Role in Protection Scheme

### ***Device Coordination & Application***

- Coordination Margins
- Coordination Between Devices
  - Fuse/Fuse
  - Recloser/Fuse
  - Recloser/Recloser
  - Sectionalizer/Recloser
- Distributed Generation Protection

### ***Underground Distribution Protection***

- Protection Philosophy
- Switchgear and protective equipment

### ***Distribution System Reliability***

- Reliability Indices
- Identifying Sectionalizing Points
- Effect of sectionalizing on reliability

### ***Protective Coordination Analysis***

- Sample Problems
- System Modeling
- Study Techniques
- Evaluating Study Result



**Electric Cooperatives  
of Arkansas**

*Your Local Energy Partners*