## APPLICATION OF ENGINEERING FUNDAMENTALS Module C – Short-Circuit Analysis and System Protection

## **Course Description**

The final module will teach the basics used to calculate fault current in a power system. Topics to be covered include the per unit system and an introduction to symmetrical components. The effect of transformer connections on fault current calculations will be discussed. The concept of an assumed fault impedance and how this is often used to establish a sensitivity level for overcurrent devices will also be covered. The overcurrent protection will include substation transformer protection, coordination with distribution feeders, and coordination of reclosers and fuses. The student will coordinate devices using graphs, and the class will also work on a sample substation service area. The overvoltage protection will cover lightning theory, basic impulse insulation level (BIL), application of lightning arresters, and grounding. The class will work problems to determine the margin of protection and to determine the BIL of a structure.

## Who Should Attend

- Early-career Engineers
- > Two-year Engineering/Electrical Technology Program Graduates
- > Senior Technical Personnel Who Function or Will Function as Utility Engineers

## Course Highlights

- Short Circuit Studies
  - System modeling
  - Impedance models
  - Theory of fault resistance
  - Zones of protection
- Overcurrent Protection
  - Substation transformer
    - Fuses
      - o Breaker/relays
- Feeder protection
  - Reclosers
  - Upstream coordination
- Coordination of downline devices
  - Recloser/recloser
  - Recloser/fuse
  - Fuse/fuse
- Overvoltage Protection
  - Lightning/BIL theory
  - Arrester application
  - Grounding considerations
  - Underground application
  - Case studies