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Short Circuit Study & Protective Device Coordination

View Course Details

COURSE DATES AND TIMES

April 16-17 , 2026

10:00 am - 4:30 pm ET

This 12-Hour (2 Day) Short Circuit Study & Protective Device Coordination Study live online instructor-led course gives students an understanding of what is involved in performing both a Short Circuit Study and a Protective Device Coordination Studies on industrial, commercial and institutional power systems.

This course should be taken with our **Power System Fundamentals** Course - April 10, 2026

This course is also a companion to our **Arc Flash Analysis Training** Course - April 23-24, 2026

Short Circuit Study & Protective Device Coordination

A power system study is a crucial document for any power system. Even small power systems are having power system studies performed to comply with more stringent codes and regulations. Due to the high reliability requirement imposed upon the operation of data centers it is an absolute necessity.

A power system study typically consists of three studies: Short Circuit Study, Protective Device Coordination Study, and Arc Flash Study. While these individual studies may sometimes be considered separately, they are very much interrelated. It is therefore recommended that these studies be conducted simultaneously by the same engineer(s) to ensure the most accurate results.

Short Circuit Study
The purpose of a short circuit study is to identify the maximum available fault current at all locations, called busses, in the power system. It is then compared with the ratings of the individual power system components to determine if the equipment is adequately rated to safely withstand or interrupt the calculated fault current. The results of the short circuit study are also used in both the coordination study and the arc-flash study.

Protective Device Coordination Study
The purpose of a protective device coordination study is to determine the proper settings for overcurrent protective devices in the power system. Ideally, the selection of the proper settings will both protect the power system equipment as well as remove only the smallest portion of the electrical system as necessary from service in order to isolate a fault. In most cases however compromises must be made in order to provide the best overall system reliability.

A Short Circuit Study is the analysis of an electrical system that determines the magnitude of the currents that flow during an electrical fault. Comparing these calculated values against the equipment ratings is the first step to ensuring that the power system is safely protected. Once the expected short circuit currents are known, a Protective Device Coordination Study is performed to determine the optimum characteristics, ratings, and settings of the power system protective devices.

This **Short Circuit Study & Protective Device Coordination Study** course gives students an understanding of what is involved in performing both a Short Circuit Study and a Protective Device Coordination Study.

The Short Circuit Study course module will provide students with an understanding of how to calculate short circuit levels on three phase power systems. One of the important purposes of calculating short circuit levels is to facilitate the application and setting of protective relays.

This **Short Circuit Study** course module will present the fundamentals of power system protection so that attendees will understand:

- Impact of short circuits on power systems
- Use of per unit systems and comparison with physical units
- Symmetrical components
- Manual calculations of balanced and unbalanced short circuits
- Network and machine data for short circuit calculations
- Applications of short circuit studies
- Short circuit model validation

The **Protective Device Coordination Study** course module will provide students with an understanding how overcurrent protection is applied to power distribution systems.

This course will present the fundamentals of distribution system protection so that attendees will understand:

- Why overcurrent protection works
- System grounding
- Time current characteristics
- Fuse protection

- Overcurrent relays
- Selective coordination
- Current Time Intervals (CTIs)

WHO SHOULD ATTEND

Short Circuit Study & Protective Device Coordination course is designed for utility, industrial, commercial and institutional power system electrical engineering personnel, electrical consulting engineers, as well as electrical design engineers, who are responsible for the reliable design, engineering and operation and of industrial, commercial and insitutional electric power distribution systems. Plant, facility, and corporate electrical engineers dealing with one or more company distribution systems and consulting and utility engineers dealing with clients' systems. Consultants, architect-engineers will also find this course very beneficial.

STUDENTS RECEIVE

- This Course Includes Our Latest Electrical Electrical Protection And Arc Flash Safety Handbooks!! (Value $20)
- Certificate of Course Completion
- **$100 Coupon** Toward Any Future Electricity Forum Event (Restrictions Apply)
- Course Materials in PDF Format
- 1.2 Continuing Education Unit (CEU) Credits (12 Professional Development Hours)
- **FREE** Magazine Subscription (Value $50.00)

COURSE OUTLINE

Short Circuit Study & Protective Device Coordination Training Course Outline

DAY ONE

- **Short Circuit Theory and Analysis**
- Effect of Short Circuit, Arcing and Burning
- Fault Current Sources
- Utility System, Motor and Generators
- Fault Current Types and characteristics
- Symmetrical Versus Asymmetrical Fault currents
- AC and DC decrements
- Fault Calculations, impedance modelling
- Balanced Faults and Unbalanced fault
- Symmetrical Components

Balanced Fault Calculations

- Ohmic Model
- Percent Model
- Per-unit Model
- Select and Calculate Base Values
- Data Collection and Modelling
- Data Requirements
- Utility short circuit currents and X/R ratio
- Fault calculation procedure
- Per-Unit Impedance calculations
- Complex Impedance diagrams
- Machine reactance modelling
- Thevenin equivalent networks
- Infinite Bus Calculations
- Exercise – Per Unit Modelling
- Typical Industrial Power Systems modelling using EasyPower software

Electrical Equipment Ratings:

- Switchgear Rating and selection criteria
- Protective device Interrupting Ratings
- Equipment components withstand ratings
- Low Voltage Fuse and Circuit Breakers rating and selection
- Medium Voltage Power Circuit Breaker and Power Fuses Rating and selection
- Load Interrupters
- Busway and Conductors
- Equipment duty calculations
- Fully rated systems
- Low voltage series rated equipment
- Sample Calculations

Transformer Protection

- Need for protection
- Types of transformers
- Transformer Data
- Causes of transformer overheating
- Transformer primary protective device
- Transformer through-fault capability
- Factors affecting transformer protection
- Basic transformer protection
- NEC and CEC requirements
- Coordination criteria

DAY TWO

Generator Protection

- Generator protection introduction
- Classification of generator applications
- Generator decrement characteristics
- Short-circuit performance
- Generator protective device

Conductor and Bus Protection:

- General consideration
- Cable protection
- Short-circuit current protection of cables
- Overload protection of cables
- Physical protection od cables
- Code requirements for Protection of cables
- Busway protection

Motor Protection

- Factors to consider in protection of motors
- Types of protection
- Overcurrent protection
- Low-voltage motor protection
- Low voltage motor ground-fault protection
- Medium-voltage motor protection
- Application of stator winding temperature protection

Overcurrent Coordination Fundamentals:

- Overcurrent protection general consideration
- Overcurrent protection guidelines
- TCC Plots
- CTIs
- Data collection for coordination study
- Phase coordination
- Ground-fault coordination
- Ground-fault protective schemes

Fuse Characteristics:

- Low Voltage Fuses
- Power Fuses
- TCC Curves
- Fuse Coordination Criteria
- Current-limiting characteristics
- Application of low-voltage fuses

LV Circuit Breaker Characteristics:

- Molded Case Circuit Breakers (MCCBs)
- Low Voltage Power Circuit Breakers
- Time Current Curves (TCC)
- Coordination Criteria

Time overcurrent relays

- Introduction
- Electromechanical Relays
- Relay Characteristics
- Solid State Relays
- CTIs

EasyPower System Modelling Exercise

Course Schedule

Start: 10 a.m. Eastern Time
Finish: 4:30 p.m. Eastern Time

Contact us Today for a FREE quotation to deliver this course at your company's location.

Request Quote