



Creating and training a best-in-class team takes time and financial resources - two things that are typically limited in today's over-taxed workforce. Add the challenges of skilled labor attrition to the mix and you quickly understand the need for effective training.

Through a complete on-site analysis of your team's current skill levels, your performance goals, your equipment, and any skill gaps that exist in your workforce, we can customize a program that delivers the most effective instruction to maximize skill transfer. The obvious benefit of customized on-site instruction is that your team is trained on your equipment, operations, and systems but it also eliminates employee travel and living expenses. And, since training is conducted during your employees' normal working hours, no shift differential costs are incurred.

Our instructors are industry experts who have honed their skills through years of field experience and remain active in their field of expertise.



**Electrical** Almost all of the many courses listed in this section are intended to be customized for presentation at a time and place requested by a customer, providing affordable custom training that meets specific needs. Course materials and presentations are tailored to each customer's facility, systems, operations, and policies, as well as the general level of knowledge exhibited by that customer's personnel. Your employees will gain the knowledge they need to do their jobs safely and efficiently, while you train twice as many people at an affordable cost.

## Arc Flash and NFPA 70E Compliance

Electrical hazards—specifically shock, arc flash, and arc blast—can result in serious injury or death to electrical workers. Ensuring worker safety and meeting the challenges of the new arc flash safety requirements can be a difficult task to accomplish in-house without the assistance of resources familiar with industry standards and recommended practices.

Electrical Reliability Services has developed a comprehensive Arc Flash Program to help reduce your risk, provide required worker safety, and ensure regulatory compliance. Our Arc Flash Solutions program consists of tools and services including:

- Arc Flash Hazard Analysis
- Arc Flash Hazard Labeling Plan
- Site Review / Compliance Assessment
- Design Review
- Single Line Diagrams
- Short Circuit and Coordination Studies
- Preventive Maintenance
- Electrical Safety Program Review / Development Training
- Personal Protective Equipment Plan
- Optional Annual Re-certification
- Documentation

From design review, analysis, and labeling to training and documentation, only Emerson has the knowledge and experience to seamlessly integrate all the essential services to deliver an effective arc flash program. Look to us as your partner. We'll be with you every step of the way with the right combination of technology, people, and services.

**Call 775-746-8484 for details!**

## Live Webcast Training

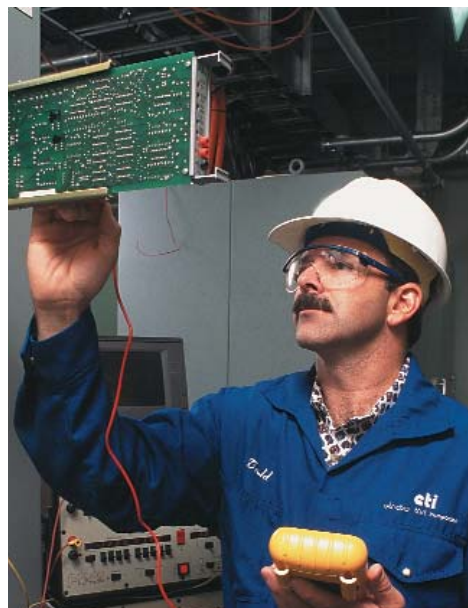
Any of our knowledge based courses can be taken via a live webcast presentation. These are interactive learning experiences. Our instructors are trained specifically on techniques that will make this experience highly successful. We have blended learning experiences that combine the webcast with online exercises and independent study. The strength of this training is:

- Eliminates travel to attend training
- Reduces overall cost of training
- Allows for economically training small numbers
- Can be used to bring students together from different locations

### Consider

- This training is easily customized
- With the blended training options learning is reinforced over time
- A Live webcast allows the student to interact with the instructor
- Training can be broken up into small blocks to fit your schedule

**Call 775-746-8484 for details!**



## E-Learning

Any of our knowledge based courses can be taken via e-learning. We have also established a process that allows us to develop custom e-learning courses at prices comparable to off the shelf material. We have blended learning experiences that combine e-learning with webcasts and independent study. Our instructors are available to answer questions as part of the e-learning experience. The strength of this training is:

- Students can progress at their own pace and on their own time
- Allows for economically training any number of students
- Eliminates travel to attend training
- Reduces overall cost of training

### Consider

- This training is easily customized
- With the blended training options learning is reinforced over time
- The student has opportunities to interact with the instructor
- Training can be broken up into small blocks to fit into your schedule

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**Electrical Safety for OSHA 1910 and NFPA 70E**

**Course ES113 CEUs: .7**

**Overview**

This 1-day course covers the inherent dangers that exist with generation, transmission, and distribution of electricity. The proper use of safety equipment, knowledge of electrical hazards, and knowledge of how to respond in the event of an electrical disaster are absolutely essential for all electrical personnel. This electrical safety program will provide the student with the information needed to comply with the latest OSHA and NEC mandates and introduce the NFPA 70E arc/flash requirements. The latest technology, standards, and materials available are presented. Anyone who works on or near electrical equipment or distribution systems should attend this course. Additionally, supervisors, managers, safety personnel, and those responsible for ensuring a safe work environment should attend this course. Students will learn:

- Information required to comply with OSHA 1910 & NFPA70E
- How to select proper PPE
- Employer & employee responsibilities
- Safe work practices

**Topics**

- Electrical Safety Training Requirements
- Qualification Requirements
- Electric Shock & Shock Prevention
- Equipment Grounding
- Electric Arc/Blast
- Quantifying the Hazard
- Prevention of Hazards from the Arc/Blast
- Selection and Use of Personal Protective Equipment
- Lockout/Tag out Procedures
- Switching Operations

**Price/Location/Start Date:**

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

**Live Webcast Electrical Safety for OSHA 1910 and NFPA 70E**

**Course ES1W1 CEUs: .6**

**Overview**

This 6-hour webcast covers the inherent dangers that exist with generation, transmission, and distribution of electricity. The proper use of safety equipment, knowledge of electrical hazards, and knowledge of how to respond in the event of an electrical disaster are absolutely essential for all electrical personnel. This electrical safety program will provide the student with the information needed to comply with the latest OSHA and NEC mandates and introduce the NFPA 70E arc/flash requirements. The latest technology, standards, and materials available are presented. Anyone who works on or near electrical equipment or distribution systems should attend this course. Additionally, supervisors, managers, safety personnel, and those responsible for ensuring a safe work environment should attend this course. Students will learn:

- information required to comply with OSHA 1910 & NFPA70E
- how to select proper PPE
- employer & employee responsibilities
- safe work practices

**Topics**

- Electrical Safety Training Requirements
- Qualification Requirements
- Electric Shock and Shock Prevention
- Equipment Grounding
- Electric Arc/Blast
- Quantifying the Hazard
- Prevention of Hazards from the Arc/Blast
- Selection and Use of Personal Protective Equipment
- Lockout/Tag out Procedures
- Switching Operations

If you want to join this regularly scheduled webcast please call for scheduled times and dates.

**Price:** \$450.00 per person  
Call 775-746-8484 to Discuss

**Implementing NFPA-70E**

**Course ES112 CEUs: .7**

**Overview**

This 1-day course covers the standard for protection from arcing faults, NFPA 70E. These faults can result in serious injury or death to electrical workers. Ensuring worker safety and meeting the challenges of the new arc flash safety requirements can be a difficult task without assistance from resources familiar with industry standards and recommended practices. The proper use of safety equipment, knowledge of electrical hazards, and knowledge of how to respond in the event of an electrical disaster are absolutely essential for all electrical personnel or those working on or around electrical equipment. This electrical safety program is designed to explain the principles of arc flash protection, avoiding unsafe acts, working safely, and understanding codes and standards relating to the industry. The latest technology, standards, and materials available are presented and demonstrated. Students will know:

- how to select proper PPE based on arc/flash
- how incident energy calculations are made
- correct labeling procedures
- how to interpret NFPA 70E requirements

**Topics**

- Background and Safety Fundamentals
- Working on or Near Live Parts
- Fundamentals of Arc Flash Hazards
- Codes and Standards
- Flash Hazard Analysis Review
- Introduction to Calculating Short Circuit Currents
- Introduction to Calculating Arcing Currents
- Effects of Clearing Times
- Determining Working Distances
- Enclosure Effects
- Facility Electrical Safety Program
- Performing Shock Hazard Analysis
- Use of Energized Work Permits

**Price/Location/Start Date:**

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## Troubleshooting Electrical Systems and Equipment

### Course EF331 CEUs: 1.4

#### Overview

This 2-day course presents a logical approach to troubleshooting electrical power systems. Fully functioning lab systems and operating distribution equipment are used to provide hands on troubleshooting experience. During the course students will be given practical exercises for evaluation. Upon completion, students will be able to:

- analyze diagram types, devices & symbols
- identify the main focus of the problem
- implement the initial approach to troubleshooting including testing instruments
- identify the operational requirements for breakers, relay, switches, ATS, synchronizers and transformers

#### Topics

- Diagram Analysis
- Test Instrument Techniques for Troubleshooting
- Initial Approach to Troubleshooting
- Focused Approach to Troubleshooting
- Basic Support Requirements
- Troubleshooting Safety
- Operational Requirements of Given Devices
- Operational Considerations

#### Price/Location/Start Date:

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

## Motor & Motor Controllers

### Course EM131 CEUs: 1.4

#### Overview

This 2-day course covers the operation and maintenance of both motors and motor controllers. During the course students will be given practical exercises for evaluation. Students will:

- understand the operation/maintenance of industrial motors to save equipment and operational dollars
- troubleshoot the motor problem and apply the solution to fix it

#### Topics

- Safety Protection and Hazards
- Basic Types of Motors
- Nameplate Terminology
- Construction of a Motor
- Sizes, Voltages and Applications
- Connection Diagrams
- Basic Control Circuits
- Motor Control Centers
- Lab Exercises

#### Price/Location/Start Date:

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

## Basic Electricity

### Course EF121 CEUs: 1.4

#### Overview

This 2-day course is designed to begin the understanding of electricity and develop into a logical presentation of common electrical components. Anyone seeking to gain a basic understanding of the principles of electrical safety or who works on or near electrical equipment or are new personnel to the industry should attend this course. Students will learn & implement:

- various electric theories
- meter readings
- electrical diagrams

#### Topics

- Electric Theory
- Circuit Protection
- Components
- Electrical Diagrams
- Multi Meters
- Insulation Testing
- Troubleshooting

#### Price/Location/Start Date:

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

## Electrical Diagram Analysis

### Course EF221 CEUs: .7

#### Overview

This 1-day course is designed to provide knowledge of the various types of electrical diagrams used in the industry, and to develop the skills necessary to read, draw and interpret these diagrams. Anyone who works on or near power generation, transmission, or distribution systems, supervisors, managers, safety personnel, training managers, and those responsible for ensuring a safe work environment should attend.

- identify all types of electrical diagrams
- understand electrical diagrams/symbols
- draw electrical diagrams

#### Topics

- Intro. into Diagrams, Including Purpose, Components and Coding Methods
- Electrical Diagram Symbols/Device Numbers
- Types of Electrical Diagrams
- Practical Exercise in Reading Various Types of Diagrams
- Electrical Distribution Systems

#### Price/Location/Start Date:

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

## Power Systems Operation and Maintenance

### Course ED121 CEUs: 1.4

#### Overview

This 2-day class will utilize lecture, visual aids, case history examinations, and hands-on demonstration to provide the greatest possible exposure to power distribution systems. It is designed to provide those involved in electrical power systems such as engineers, contractors, and facility personnel with an understanding of the overall operation of a power system. Students will learn:

- analyze the current flow in a diagram
- operate major components: switchgear, panelboards, transformers, etc.

#### Topics

- Electrical Fundamentals (Review)
- Diagram Analysis
- Maintenance Issues & Operation - Major Components
- Operation and Maintenance Techniques

#### Price/Location/Start Date:

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

**Enhanced System Reliability Through Maintenance**

**Course EF332 CEUs: 1.4**

**Overview**

This 2-day course covers the identification of common factors that jeopardize the reliability of power systems. Understanding the importance of power system maintenance is a critical skill and this course is designed to provide those involved with electrical power systems such as engineers, contractors, and facility personnel with an understanding of what facilitates the reliability of a power system. Students will learn:

- what makes a system unreliable
- the three way approach to maintenance
- long term maintenance elements

**Topics**

- Introduction Including System Unreliability Corrective Actions to Offset the Effects of Age, Barriers and More
- The Logical Approach to Maintenance
- Essential Elements- Maintenance Program

**Price/Location/Start Date:**

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

**Substation Application, Operation and Maintenance**

**Course ED351 CEUs: 2.1**

**Overview**

This 3-day class covers the safe operation of a substation to include recognition of specific hazards and safe switching. Anyone responsible for the operation or performing maintenance, or anyone considering the purchase of a substation should attend to gain a working knowledge of the condition indicators used. Once completed, students will be able to:

- analyze the current flow in a diagram
- maintain & operate major components such as switchgear, panelboards, transformers, etc.
- safely deal with electric shock and use personal protective equipment

**Topics**

- Safety Hazards and Protection
- System Design
- Switching
- Operation
- Substation Equipment
- System Protection
- Substation Maintenance

**Price/Location/Start Date:**

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

**Harmonics and Power Quality**

**Course EP221 CEUs: 1.4**

**Overview**

This 2-day course will be presented using lecture, visual aids and hands on experience. Anyone seeking to maximize uptime while reducing operational and maintenance costs, having or considering installing the equipment, or seeking to understand the complex makeup of power distribution systems should attend. Students will learn:

- harmonics/transients/grounding

**Topics**

- Sources of Harmonic Distortion
- Effects of Harmonics on Electrical Systems
- Measuring Techniques for Harmonic Voltages and Currents
- Techniques- Mitigating Harmonics Problems
- Interference
- Transient Voltage Surge-Suppression
- Grounding
- Troubleshooting Techniques
- Power Sags and Swells

**Price/Location/Start Date:**

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss



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## Medium-Voltage Motor Control

### Course EM211 CEUs: .7

#### Overview

This 1-day course provides a comprehensive overview on medium voltage motor control. Anyone who works on industrial motors or motor controls, maintenance personnel, engineers, and process or equipment operators should attend. This course is also valuable as an introduction to troubleshooting for anyone in a motor environment. It uses:

- lectures/visual aids
- case history examination
- hands-on demonstration

#### Topics

- Types of Motor Controllers
- Contractor Construction
- Safety
- Nameplate Data and Ratings
- NETA Maintenance Testing Specifications
- Record Keeping

#### Price/Location/Start Date:

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

## Low and Medium Voltage Circuit Breakers

### Course ED365 NEW CEUs: 1.4

**Overview** This 2-day class introduces the student to different types of breaker construction, the operation of the breakers and proper methods inspect, test and troubleshoot low and medium voltage circuit breakers. The course covers various causes of breaker failure, safety issues and steps for getting back on line as soon as possible. Anyone who works on or near power generation, transmission, or distribution systems should attend this course. Once completed, students will be able to:

- recognize normal and faulted operation of circuit breakers
- know the preventative test methods and specifications
- safely perform breaker racking operation
- understand breaker and relay trip functions and timing

#### Topics

- Safety Hazards and Protection
- Circuit Breaker Design
- Theory of Operation
- Operation
- Preventative Maintenance and Testing
- Trip Units and Trip Curves

#### Price/Location/Start Date:

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

## Grounding Theory, Application and Testing

### Course EP111 CEUs: .7

#### Overview

This 1-day course will provide a comprehensive overview on electrical grounding. Anyone who works on or near power generation, transmission, or distribution systems, supervisors, managers, safety personnel, and those responsible for ensuring a safe work environment should attend this course.

- lectures/slides/case history examinations
- hands-on demonstration

#### Topics

- Background
- National Electrical Code
- Deriving a Ground
- Ground Faults
- Ground Installation
- Inspection and Test Procedures
- Recording Data

#### Price/Location/Start Date:

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

## Uninterruptable Power Supplies

### Course EU315 NEW CEUs: .7

#### Overview

This 1-day class presents the design, operation and maintenance of UPS systems. The course covers the information necessary to understand key UPS indications and failure modes. Anyone who operates, maintains or monitors UPS systems should attend this course. Once completed, students will be able to:

- recognize normal and faulted operation UPS systems
- know the preventative test methods and specifications
- safely perform UPS isolation and maintenance
- understand UPS construction and theory of operation

#### Topics

- Safety Hazards and Protection
- UPS Design
- Theory of Operation
- Normal Operation
- Bypass Operation
- Preventative Maintenance and Testing
- Fault Codes and Response

#### Price/Location/Start Date:

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

## Introduction to Programmable Controllers

### Course EM231 CEUs: 2.1

#### Overview

This 3-day course is a basic introduction to the operation of programmable control systems. Anyone who is responsible for the operation and maintenance of automated processes or equipment, maintenance personnel, engineers and process or equipment operators should attend. Students will learn:

- critical concepts, tools & skills to begin troubleshooting
- the use of available systems and information such as trouble codes, lights and monitors

#### Topics

- PLC Logic
- Controller Operation
- Introduction to Troubleshooting
- Introduction to GE Series of PLC's
- Introduction to Programming

#### Price/Location/Start Date:

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss





**Circuit Protection**

**Course EC111 CEUs: .7**

Circuit protection systems may have the single largest impact on power reliability, second only to grounding systems. The devices that make up circuit protection systems are common. Almost everyone has some understanding of their operation. However, few have a complete understanding of these devices sufficient to significantly improve the safe and reliable operation of industrial power systems.

**Overview**

Anyone seeking to gain a basic understanding of the principles of circuit protection devices should attend this 8-hour session. Also, anyone who works on or near electrical equipment, or personnel new to the industry. This program will enable personnel to:

- understand the basic principles of a protective system
- state the functions of protective devices
- apply principles to a specific power system

**Topics**

- Protection Goals
- Fault Anatomy
- Fuses
- Circuit Breakers
- Protective Relays
- Ground Fault Systems
- Surge Suppression

**Price/Location/Start Date:**

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

**Ground Fault Protection for Low-Voltage Equipment**

**Course EC211 CEUs: .7**

**Overview**

This 1-day course will use lectures, visual aids, and hands on demonstrations. Anyone who works on or near power generation, transmission, or distribution systems, supervisors, managers, safety personnel, and those responsible for ensuring a safe work environment should attend this course. Students will learn:

- common problems and misunderstandings associated with ground fault system applications
- basic elements of ground fault systems

**Topics**

- Electrical Fundamentals (Review)
- Recommended Safe Practices
- Design and Operation
- Maintenance
- Test Procedures
- Troubleshooting
- Lab Exercises

**Price/Location/Start Date:**

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

**Emergency Standby Power Systems**

**Course EU212 CEUs: .7**

**Overview** This 1-day course provides a comprehensive overview of the components that make up emergency standby power systems. Anyone responsible for a facility with an emergency system, facility operators, maintenance technicians, and hospital facility managers and technicians should attend this class. Students will learn:

- codes & standards for inspection, testing & maintenance
- typical problems and solutions

**Topics**

- Codes and Standards
- Function Design
- Maintenance
- ATS
- UPS
- Case Studies

**Price/Location/Start Date:**

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## Battery Operation and Maintenance

### Course EU221 CEUs: 1.4

Substation batteries are designed and built to deliver years of dependable service when properly maintained. This 2-day course is designed to train personnel to learn the proper techniques to prolong battery life, increase uptime, minimize repair costs, and create a safer working environment.

#### Overview

This site-specific training program meets all State and Federal OSHA training requirements of personnel operating power distribution systems should attend this class.

Electrical skilled trades, supervisors, engineers and any other personnel involved in the operation or maintenance of plant power distribution equipment.

This training program will enable personnel to:

- be familiar with battery construction and operation
- conduct routine preventive maintenance on a substation battery system
- determine the cause and corrective actions of common battery problems
- gain confidence through real, hands-on training

#### Topics

- Battery Safety
- Inspection and Installation
- Battery Construction
- System Operation
- Battery Charges
- Maintenance Procedures

#### Price/Location/Start Date:

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

## Variable Frequency Drives

### Course EM331 CEUs: .7

Variable Frequency Drives (VFDs) are becoming more common in today's manufacturing facilities. This course is designed to give an understanding of the theory of operation of modern VFDs as well as applying basic troubleshooting techniques.

#### Overview

A 1-day hands on troubleshooting lab is optional with this course. This 2 or 3-day site-specific training program meets all State and Federal OSHA training requirements of personnel operating power distribution systems.

Electrical skilled trades, supervisors, engineers and any other personnel involved in the operation or maintenance of VFDs should take this class.

This training program will enable personnel to:

- understand AC motor theory
- understand the operating principles of modern VFDs
- troubleshoot common VFD problems
- gain confidence through real, hands-on training

#### Topics

- Electrical Safety
- AC Motor Theory
- VFD Operating Principles
- VFD Labs (Optional) Custom Training

#### Price/Location/Start Date:

Determined by Class Size, Location & Topic Call 775-746-8484 to Discuss

