

Training Services



Directory of Services



As the manager of Training Services I would like to thank you for your interest in our services and invite you to review the enclosed material. Our Training Services specializes in highly effective custom performance solutions and training. Our training is used to provide skills, promote safety, and increase efficiency by some of the largest companies in the world.

When it comes to the selection of training what is the common practice, what is good practice, and what is best practice? Briefly, I would say that all too often common practice is limited to identifying something attractive in promotional material. Good practice is the selection of custom training that increases the efficiency of the training to 100%. Best practice on the other hand looks at the operation and designs a spectrum of solutions that increase the efficiency of the operation. Our Training Services offers full spectrum performance evaluation services and solutions.

If you are interested in going beyond accepting something that meets some of your needs, we want to work with you. Our Training Services has specialized for years on providing custom training. This means that your training dollars can be 100% efficient. In this Directory of Services we have listed many of the courses that we have provided in the past. Please remember that these are just examples of what can be done.

If you want to target your resources to improve the performance of your operations we can assist you. Our Performance Surveys provide an independent evaluation of six key areas. Each of these six major areas contribute significantly to the safe and continuous operation of the facility. With the information gained through the Performance Survey valuable resources can be directed at the greatest potential return.

I would like the opportunity to show you just how effective we can be and am willing to guarantee your satisfaction. Give us a goal, challenge my team, and see just how effective high quality training can be.

Sincerely,
Rod Olinger
Manager, Training Services



TABLE OF CONTENTS

Meet the Team	1
OSHA Required Training	2
Custom Training Information	3
Certified Training Information	4
Skill Assessment Service	5
Performance Assessment Service	6
Safety Training Courses	
■ Basic Electrical Safety	7
■ Basic Electrical Safety in an Electronic Environment	7
■ Electrical Safety & Confined Space Awareness	7
■ Electrical Safety for Industrial Systems	8
■ Electrical Safety for Rotating Equipment	8
Technical Training Courses	
■ Basic Electricity	9
■ Electrical Diagram Analysis	9
■ Electrical Systems Operation & Maintenance	9
■ Enhanced System Reliability Through Maintenance	10
■ Substation Application, Operation & Maintenance	10
■ Transformer Construction & Maintenance	10
■ Troubleshooting Electrical Systems & Equipment	11
Power Quality Training Courses	
■ Harmonics & Power Quality	12
■ Introduction to Power Quality Audits	12
Specialized Equipment Training Courses	
■ Introduction to Power Transformers	13
■ Protective Relaying Component Fundamentals	13
■ Personal Protective Grounding Theory, Application & Testing	13
■ Medium Voltage Motor Control	14
■ Medium Voltage Vacuum Circuit Breakers	14
■ Low Voltage Power Circuit Breakers	14
■ Low & Medium Voltage Circuit Breaker Operation & Troubleshooting	15
■ Introduction to Programmable Controllers	15
■ Grounding Theory, Application & Testing	15
■ Automatic Transfer Switch Fundamentals	16
■ Emergency Standby Power Systems	16
■ Ground Fault Protection for Low Voltage Equipment	16
Certified Training Courses	
■ Troubleshooting Technician	17
■ Motor & Motor Control Technician	17
■ Substation Technician	17
■ Protective Relaying Technician	18
■ Protective Relaying Master Technician	18
■ Distribution System Technician	18
Testimonials	19

MEET THE TEAM

Our pool of experience and technical knowledge is second to none. With years of field experience behind them, our instructors truly practice what they teach. This is a little about our background....



Rod Olinger is Manager of Training Services. He has over 25 years experience in power systems and related fields. Rod retired from the US Army Corps of Engineers with extensive experience in facilities management and consulting. He is also a certified Plant Engineer.



Andy Carlson has been the Training Coordinator with the Emerson team since April 2004. He previously spent five years working as a clerk in a District Attorney's office and has also worked extensively in customer service capacities. Andy's specialty is making things happen and people happy. He is now overseeing the day-to-day operation of the training services team making sure our client's needs are met and our instructors have all the logistical support they need.



Leonard Solinap, a 30-year veteran of the United States Navy, joined our team in January 2005. He has over 20 years of experience in shipboard and industrial electrical engineering, including power distribution systems, repair, troubleshooting and overhaul of motors and generators. In addition to his Journeyman and Master Training Specialist certificates, he has a Bachelor of Science degree in Human Resource Management from the University of Maryland.



James O. Champer is a 30-year United States Navy veteran who joined the training team in September 2002. He has an aviation electrical and electronic background including power distribution systems, motors, generators, and electronic devices and equipment. Jim obtained his Master Training Specialist certificate, holds a Federal Communications (FCC) License and has a Masters degree in Business Administration (Information Technology concentration) from Touro University.



Joseph O'Dwyer joined the Emerson team in October 2004. He has over 24 years of experience in power plant generation, electrical-mechanical interfacing, including power distribution systems, repair, troubleshooting and overhaul of motors and generators. In addition to his A.A.S. Degree in Electrical Power Systems from the College of the Air Force, he has attended various electrical controls system schools.



James Hogan is a Master Instructor and Safety Consultant and has more than 22 years of experience in the operation, maintenance, and training of power generation plants. He has taught nuclear reactor and electrical theory at two separate DOE training facilities. James is retired from the Navy where his last assignment was as the senior advisor to the Commander Naval Air Forces for Reactor and Safety.



Mark S. Standifer, a Senior Instructor, joined the Emerson team in June 2005. He has over 32 years of experience in HV/MV/LV switchgear, including all types of power distribution systems, repair, troubleshooting and testing. Mark has developed numerous courses of instruction and presented training classes for the past 20 years, including video production and script consulting.

OSHA REQUIRED TRAINING

It is difficult to absolutely determine what training is required by OSHA with statements such as: “Shall also be trained in and familiar with any electrically related safety practices not specifically addressed by 1910.331 through 1910.335 **but which are necessary for their safety**” (1910.332 (b)(2)). Some guidance can be gained by reading the foreword to NFPA 70E. It says that NFPA 70E was created to assist OSHA in preparing electrical safety standards and was “intended for use by employers, employees, and OSHA.”

Article 110.16 Flash Protection from the 2002 NEC requires field markings to warn qualified employees of arc flash hazards, and directly references NFPA 70E-2000 for assistance in determining the potential hazard, developing safe work procedures, and selecting personal protective equipment. NFPA 70E-2000 further recommends training for qualified personnel in the selection, care, and use of personal protective clothing and equipment based on the potential hazard...

Some conclusions and guides can be drawn from the regulation itself and from OSHA directives. Much of the following information is taken from Directive Number STD 1–16.7, Electrical Safety-Related Work Practices—Inspection Procedures and Interpretation Guidelines. This OSHA document makes recommendations and guides OSHA inspectors in the field.

“training practices...shall be evaluated to assess whether the training provided is appropriate to the tasks being performed...”

“must be trained in safety-related work practices required by 29CFR 1910.331-335.”

“unqualified employees must be trained in the inherent hazards of electricity...”

“qualified employees must include at the minimum...ability to distinguish exposed live parts...ability to determine the nominal voltage...knowledge of clearance and/or approach distances...”

Definition of “Qualified Electrical Worker” from the 2002 National Electric Code now includes “...must have had electrical safety training.”

“Training requirements apply to all employees in occupations that carry a risk of injury due to electrical hazards...”

Qualified or Unqualified?

“Whether an employee is considered to be a “qualified person” will depend on various circumstances in the workplace. It is possible and, in fact, likely for an individual to be considered “qualified” with regard to certain equipment in the workplace, but “unqualified” as to other equipment. (See 29 CFR 1910.332 (b)(3) for training)” Even employees considered “unqualified” to perform energized electrical work may face hazards of shock or arc and blast if they work around electrical equipment or perform switching functions (turn equipment on or off) in the plant or facility.

Training Services

Training must be evaluated to determine if it covers risks your employees are exposed to. Our training is designed to meet OSHA standards and is delivered to address specific risks to your employees. The greatest protection you can provide to your employees and to your business is custom training designed around your operation.

CUSTOM TRAINING

How Many Times Have You Looked Through A Course Description Trying to Find Something That Comes Close To What You Need?

Our Training Services team works closely with you to define your needs and then builds affordable *Custom Training* around them. We use your facility, systems, operations and policies as we build course materials and presentations to deliver the greatest skill transfer possible. Rather than trying to decide whether the course applies to your operation, your employees will spend their time gaining knowledge that they will use everyday.

Custom Training is Cost Effective

With *Custom Training* you can train twice as many people for a fraction of the cost of traditional training. You can stop spending money on training that only partially meets your needs. *Custom Training* can be scheduled during your employees' normal working hours, so no shift differential costs are incurred. We come to you, so employee travel and living expenses are eliminated. Overall, the cost of *Custom Training* is a value you can't afford to turn down. Take the money you will save using *Custom Training* and train twice as many employees as you could with other programs.

Training Services Instructors are Industry Experts

With years of field experience behind them, our instructors truly practice what they teach. *Custom Training* allows our instructors to adjust the course material to target practical applications that may be concerns for you and your employees now. Open communication between students and instructors is encouraged, so if curriculum adjustments are necessary they are done immediately and no training time is lost. This ensures maximum value for your training budget and facilitates effective transfer of knowledge.

Customized Reference Material

The material used is customized for each class and facility. In most cases, it includes information on the specific pieces of equipment in your facility along with troubleshooting and safety guidelines. Manuals are clear and concise and include diagrams, pictures and examples. For these reasons, training materials are considered by many past students to be the single best reference for their future work.

Choose *Custom Training* and all of the material will answer the questions and concerns of management and employees alike. Put your training dollars to work for you!

We Can
Help
Identify
Your
Key
Issues

- Skill Competency
- Subject
- Location
- Instructional Method
- Duration
- Accreditation

CERTIFIED SERIES TRAINING



What is Certified Training?

Certified Training is a specially structured curriculum, taught by industry experts and designed for practical learning. It builds upon itself in skill set modules so that the learning of each student is maximized for career growth and professional development.

Certified Training is the Best Choice for Your Training Dollar

Taught and evaluated by industry experts, individual and overall employee performance increases through practical skill development. The very act of measuring skill sets focuses performance on skills needed to master the subject at hand. *Certified Training* courses provide a path for growth through recognition, development and documentation of specific skills.

Certified Training is cost effective because employers receive detailed documentation of competency and skill achievement which can prove useful for career development and records required by OSHA, MSHA and other agencies. This program is successful because it builds on the knowledge base, confidence and technical expertise of your employees who will come to rely on their new skills every day on the job.

Certified Training reduces risk of accidents, equipment failure and loss of production. This is achieved through the application of uniform and unbiased standards, open communication and focus on knowledge transfer. Performance skill evaluations are documented and records are maintained for use by our clients.

A Map for Progression

Certified Training acts as a guide for building the skills of your staff through a logical, modular approach to learning. *Certified Training* courses offer options that enable each course to be tailored to meet the specific needs of your facility, systems, operation and policies.

Industry Acceptance

Certified Training courses qualify for university and trade Continuing Education Units (CEU's) in most states and meet safety requirements for OSHA, MSHA and other agencies. We are an approved continuing education provider for NETA (the InterNational Electrical Testing Association).

Measurable Standards

Standards for certification are established and documented for each program and course by the knowledge and skill sets that must be demonstrated for successful completion. These standards are available for review upon request.

Program of Continuous Learning

Certified Training is constantly growing and expanding. Upon your request, we are happy to develop new courses to match your needs. Following are some of the most recent additions to our *Certified Training* program:

- Certified Distribution System Technician
- Certified Motor and Motor Control Technician
- Certified Motor and Motor Control Master Technician*
- Certified Substation Technician
- Certified Substation Master Technician
- Certified Troubleshooting Technician
- Certified Troubleshooting Master Technician
- Certified Protective Relay Systems
- Certified Protective Relay Systems Master Technician

* Successful completion of technician level course is required prior to participation in master level courses.

Certified Training Courses Provide:

- ✓ Targeted training to meet specific skill sets
- ✓ Hands on measurement of learned skills
- ✓ Certification of skill level and documentation of training

SKILL ASSESSMENT SERVICE

The Skill Assessment Program is a service we offer to companies who are looking to evaluate or develop the skills of their employees or who are wanting a complete make-over or start-up of their training operations and certification. The Training Services Skill Assessment Program can help you:

- √ Document Required Skills of Your Employees
- √ Measure Individual Skills of Your Employees
- √ Certify Hands-on Performance
- √ Create Performance Based Job Classifications

INCREASE JOB PERFORMANCE IN 3 EASY STEPS

The first step in achieving high job performance is clearly identifying required skills. Multiple tools and techniques are used to document required skills.

The second step is to define job classifications, descriptions, and objective measurements. With the high performance definitions in place we will establish an objective evaluation of existing individual skills.

Step three is to then take the information gathered in Step 2 to develop targeted training to grow needed skills.

CLIENT LIST

Our client list is long, having performed these services for over 32 years. The following examples are recent projects:

US Borax contracted us to provide training and to design a hands on evaluation/certification for over 700 technicians and electricians. The project resulted in the design and development of custom training based on their safety program and skill assessment of their employees. US Borax was able to target training resources saving time and effort and increase specific performance goals.

Hewlett Packard needed to evaluate their electrical safety policy and procedures and from that evaluation design both training and certification for their process technicians, facility maintenance technicians, and engineers. The project resulted in the development of custom training based on their safety program and skill assessment of over 200 employees. A three step process was set up for the certification of their technicians consisting of training, written tests, and hands on verification of required skills. This project allowed Hewlett Packard to certify compliance with state and federal regulations while reducing costs for vendor services.

Praxair wanted to evaluate their maintenance operations, equipment specific procedures, and safety program. The goal of the review was to design and deliver training, provide individual skill assessment, and provide certification of skill/task performance to over 250 technicians. Praxair was able to measurably increase technician's skills and verify policy compliance with this project.

PERFORMANCE ASSESSMENT SERVICE

Performance Assessment Service is another service we offer to our customers to help:

- √ Manage Risk
- √ Improve Performance
- √ Increase Efficiency
- √ Increase Return on Personnel Dollars

The ultimate goal of the Performance Assessment is to protect human life, protect property, comply with codes and standards, and increase efficiency through continuous and enhanced operations.

To accomplish this an independent evaluation of six key areas is provided:

I. Equipment Installation

Incorrectly installed equipment or inadequate equipment can lead to increased downtime or catastrophic failure. Improperly installed equipment occurs when field modifications are made during the installation of the equipment.

II. Equipment Operation & Use

Correctly designed, constructed, and installed equipment can still present a hazard to human life and property, process inefficiency, as well as increasing probability of failure if used or operated improperly.

III. Policy & Procedures

An independent review of procedures that are outlined by a regulating body, those established at Corporate level, and those established at the plant level can greatly enhance risk management.

IV. Personnel Safety

Safety cannot be achieved without the right attitude, knowledge, and tools. However, if the common accepted practices are reviewed with an unbiased eye, a high level of safety can be achieved.

V. Equipment Maintenance

The best equipment installed in the best manner can still present a hazard to human life and property if not maintained properly.

VI. Energy Efficiency

A facility energy audit will help identify each of the opportunities for saving energy costs. And, since every dollar of reduced operating expenses goes straight to the bottom line, the payback period for energy saving projects can be very short. Some utilities are also providing incentives that further shorten the payback period.

Basic Electrical Safety

Course: ET200 CEU'S: .7

Overview

This 1-day class is designed to explain the principles of recognizing and correcting dangerous conditions, avoiding unsafe acts, working safely, and understanding codes and standards relating to the industry. Individuals who work on or near electrical equipment and also individuals new to the electrical industry should attend this course. Upon completion, students will know:

- How to properly use safety equipment
- Electrical hazards
- How to respond in the event of an electrical disaster

Topics

- Background and Safety Fundamentals
- Fundamentals of Electrical Hazards
- Codes and Standards
- Federal Safety Regulations
- Safe Work Practices

Price/Location/Start Date

- Determined by class size, location & topic

Electrical Safety and Confined Space Awareness

Course: ET202 CEU'S: 1.4

Overview

A 2-day program presenting the principles of recognizing and correcting dangerous conditions, avoiding unsafe acts, working safely, and understanding codes and standards relating to the industry. Anyone who works on or near power generation, transmission, 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 become aware of:

- How to properly use safety equipment
- Electrical hazards
- How to respond in the event of an electrical disaster

Topics

- Background and Safety Fundamentals
- Fundamentals of Electrical Hazards
- Codes and Standards
- Federal Safety Regulations
- Safe Work Practices
- Confined or Enclosed Work Space
- Practical Exercises and Examination
- Electrical Maintenance for Safety

Price/Location/Start Date

- Determined by class size, location & topic

Basic Electrical Safety in an Electronic Environment

Course: EC201 CEU'S: .7

Overview

This 1-day safety program is designed to explain the principles of recognizing and avoiding dangerous conditions, unsafe acts, working safely, and understanding codes and standards relating to the industry. Those who should attend this course include non-electrical workers in an electronic environment, as well as anyone seeking to gain an understanding of basic electrical safety in an electronic environment. Upon completion, students will know:

- How to properly use safety equipment
- Safety regulations
- Safety fundamentals and safe work practices

Topics

- Electrical Circuits
- Safety Background
- Safety Fundamentals
- Safety Standards
- Fundamentals of Electrical Hazards
- Safe Work Practices
- Grounding

Price/Location/Start Date

- Determined by class size, location & topic



Electrical Safety for Industrial Systems

Course: ET204 CEU'S: .7

Overview

This 1-day course explains the principles of recognizing and correcting dangerous conditions, avoiding unsafe acts, working safely, and understanding codes and standards relating to distribution, maintenance and repair of electrical apparatus. Anyone who works on or near power generation, transmission, or distribution systems, supervisors, managers, safety personnel, and those responsible for insuring a safe work environment should attend this course. Some of the subjects the students will learn about include:

- Shock prevention
- Enforcement agencies
- Employer & employee responsibilities

Topics

- Safety Background and Fundamentals
- Fundamentals of Electrical Hazards
- Codes and Standards
- Federal Safety Regulations
- Safe Work Practices
- Grounding Practices
- Electrical Maintenance for Safety
- Testing for Safety

Price/Location/Start Date

- Determined by class size, location & topic

Electrical Safety for Rotating Equipment

Course: ET205 CEU'S: .7

Overview

This 1-day course explains the principles of recognizing and correcting dangerous conditions, avoiding unsafe acts, working safely, and understanding codes and standards relating to the maintenance and repair of rotating equipment. Anyone who works on or near power generation, transmission, or distribution systems, supervisors, managers, safety personnel, and those responsible for insuring a safe work environment should attend this course. Some of the subjects the students will learn about include:

- Shock prevention
- Employer & employee responsibilities
- Motor services

Topics

- Safety Background and Fundamentals
- Fundamentals of Electrical Hazards
- Codes and Standards
- Federal Safety Regulations
- Safe Work Practices for Rotating Equipment
- Grounding Practices
- Electrical Maintenance for Safety
- Motor Service Lab (Hands on Field Lab)

Price/Location/Start Date

- Determined by class size, location & topic



Basic Electricity

Course: ET300 CEU'S: 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, works on or near electrical equipment or are new personnel to the industry should attend this course. Students who take this course will learn and be able to 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



Electrical Diagram Analysis

Course: ET301 CEU'S: .7

Overview

This 1-day course is designed to provide the 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 manager, and those responsible for ensuring a safe work environment should attend this course. After completion, students will be able to:

- Identify all the types of electrical diagrams
- Understand electrical diagrams and their symbols
- Draw electrical diagrams

Topics

- Introduction into Diagrams, Including Purpose, Components and Coding Methods
- Electrical Diagram Symbols and 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

Electrical Systems Operation & Maintenance

Course: ET302 CEU'S: 1.4

Overview

This 1 or 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. This course 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. A successful student in this class will have learned how to:

- Analyze the current flow in a diagram
- Maintain and operate major components such as switchgear, panelboards, transformers and more
- Safely deal with electric shock and use personal protective equipment

Topics

- Electrical Fundamentals (Review)
- Diagram Analysis
- Maintenance and Operation of Major Components
- Electrical Safety
- Operation and Maintenance Techniques

Price/Location/Start Date

- Determined by class size, location & topic

Enhanced System Reliability Through Maintenance

Course: ET304 **CEU'S: 2.1**

Overview

This 3-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. Upon completion of this class, 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 of a Maintenance Program

Price/Location/Start Date

- Determined by class size, location & topic

Substation Application, Operation & Maintenance

Course: ET305 **CEU'S: 3.5**

Overview

This 5-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:

- Understand the operation and maintenance of substations
- Implement troubleshooting skills and apply them

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

Transformer Construction & Maintenance

Course: ET306 **CEU'S: .7**

Overview

This 1-day course provides a comprehensive overview of electrical transformers found in the industry. It is targeted to those involved in the installation, operation and maintenance of electrical power systems. 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 to:

- Test transformers for problems and failures
- Identify the different types of transformers
- Identify transformer accessories

Topics

- Basic Transformer Theory
- Construction
- Applications
- Nameplate Data
- Accessories
- Maintenance and Testing
- Safety

Price/Location/Start Date

- Determined by class size, location & topic



Troubleshooting Electrical Systems & Equipment

Course: ET307 **CEU's:** .7

Overview

A 1-day class presenting the logical approach to troubleshooting electrical power systems. 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. Upon completion, students will know how to:

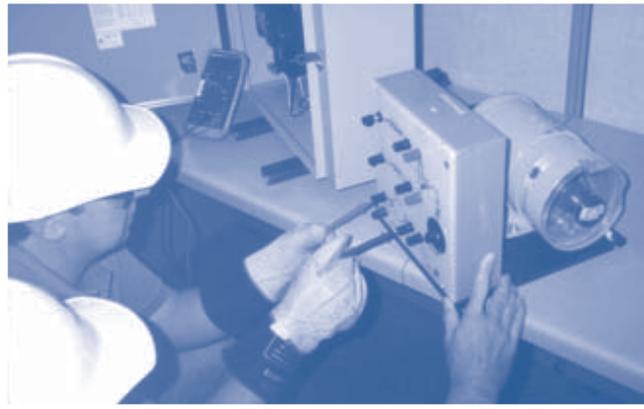
- Plan, evaluate, record and observe
- Focus on the electrical problem and fix it
- Identify basic system equipment

Topics

- Testing and Evaluation
- A Focused Approach to Troubleshooting
- Basic Support Requirements
- Diagram Analysis
- Operational Requirements
- Operational Considerations
- Case Studies

Price/Location/Start Date

- Determined by class size, location & topic



Harmonics & Power Quality

Course: ET400 **CEU'S: 1.4**

Overview

This 2-day course will be presented using lecture, visual aids and hands on experience. 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. Upon completion, students will learn about three major areas of power quality:

- Harmonics
- Transients
- Grounding

Topics

- Sources of Harmonic Distortion
- Effects of Harmonics on Electrical Systems
- Measuring Techniques for Harmonic Voltages and Currents
- Techniques for 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



Introduction to Power Quality Audits

Course: ET401 **CEU'S: 1.4**

Overview

This 2-day class introduces the concepts, steps, and actions necessary to perform a site audit. 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 to:

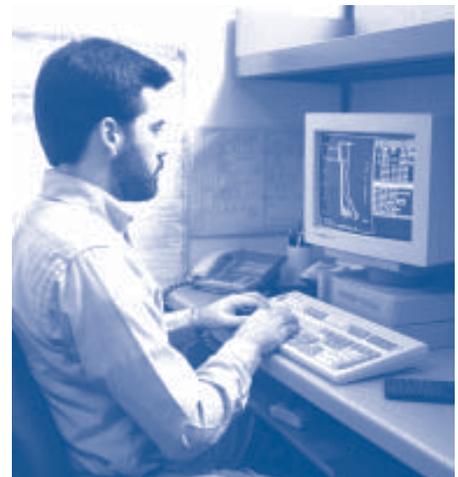
- Identify and define typical site problems
- Diagnose and reduce typical site problems
- Develop skills in working with audit test equipment

Topics

- Fundamentals of Electricity
- Power Distribution and Wiring Methods
- Power Problems and Conditioning
- Basic Electrical Safety
- Site Audit Techniques
- Power Conditioning Products

Price/Location/Start Date

- Determined by class size, location & topic



Introduction to Power Transformers

Course: ET500 **CEU'S: .7**

Overview

This 1-day course provides a basic overview of electrical transformers found in the industry. 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. This class will use:

- Lectures
- Visual aids
- Hands-on demonstration of the equipment and testing procedures

Topics

- Basic Transformer Theory
- Construction
- Applications
- Nameplate Data
- Interference
- Maintenance and Testing
- Safety

Price/Location/Start Date

- Determined by class size, location & topic

Protective Relaying Component Fundamentals

Course: ET501 **CEU'S: .7**

Overview

This 1-day course introduces the basic operating concepts of an overcurrent relay. 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:

- Basics of testing simple relays
- Standard specifications for testing and test results

Topics

- The Language of Protective Relaying
- Basic Relay Theory and Operation
- Testing Concepts and Test Equipment Use
- Recording and Managing Test Data
- Safety

Price/Location/Start Date

- Determined by class size, location & topic

Personal Protective Grounding Theory, Application & Testing

Course: ET502 **CEU'S: .7**

Overview

This 1-day class will use lectures, visual aids, case history examinations, and hands-on demonstration. 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 to perform or apply:

- Safe de-energization
- Lock-out
- Personal grounds
- Removal of protective grounds

Topics

- Safety
- Qualified Persons
- Construction of Protective Grounds
- Testing Protective Ground Sets
- Application of Protective Grounds
- Grounding Schemes
- Sizing Protective Grounds
- The Process of Using Protective Grounds
- Grounding Lab and Evaluation

Price/Location/Start Date

- Determined by class size, location & topic



Medium Voltage Motor Control

Course: ET503 **CEU'S:** .7

Overview

This 1-day course provides a comprehensive overview on medium voltage motor control. 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. This course 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



Medium Voltage Vacuum Circuit Breakers

Course: ET504 **CEU'S:** .7

Overview

This 1-day course studies the vacuum circuit breaker from operation fundamentals through maintenance and troubleshooting. Anyone seeking to maximize uptime while reducing operational and maintenance cost, anyone having this equipment installed or anyone seeking to understand the hazards associated with the operation should attend this course. Students will learn:

- Various causes of breaker failure
- Correct response

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

Low Voltage Power Circuit Breakers

Course: ET505 **CEU'S:** 1.4

Overview

This 2-day course provides a comprehensive overview of low voltage power circuit breakers. 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. The students will be introduced to:

- Low voltage circuit breaker construction
- Operation of the breakers
- Proper methods for troubleshooting breaker failures

Topics

- Types of Circuit Breakers
- Nameplate Data and Ratings
- Circuit Breaker Components
- Drawout Mechanism Operation
- Trip Curves
- Electro-Mechanical Trip Curves
- Trip Units
- Schematics
- Safety
- Testing

Price/Location/Start Date

- Determined by class size, location & topic



Low & Medium Voltage Circuit Breaker Operation & Troubleshooting

Course: ET506 **CEU'S:** .7

Overview

This 1-day course introduces the student to different types of breaker construction, the operation of the breakers and proper methods to troubleshoot breaker failures. 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 also learn about:

- Various causes of breaker failure
- Safety issues
- Steps for getting back on line

Topics

- Introduction and Theory
- Methods of Interrupting an Electrical Arc
- Low and Medium Voltage Circuit Breaker Construction
- Circuit Breaker Troubleshooting Considerations
- Safety
- System Review

Price/Location/Start Date

- Determined by class size, location & topic

Introduction to Programmable Controllers

Course: ET507 **CEU'S:** 2.1

Overview

This 3-day course is a basic introduction to the operation of programmable control systems. 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:

- Critical concepts, tools and 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

Grounding Theory, Application & Testing

Course: ET508 **CEU'S:** .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. This seminar will use:

- Lectures
- Slides
- Case history examinations
- Hands-on demonstration

Topics

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

Price/Location/Start Date

- Determined by class size, location & topic



Automatic Transfer Switch Fundamentals

Course: ET509 **CEU'S:** .7

Overview

This 1-day course is a review of the application and capability of the ATS to automatically and manually supply power to emergency loads. 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:

- Functional testing techniques
- Maintenance procedures
- Troubleshooting

Topics

- Electrical Fundamentals
- Recommended Safe Practices
- Design and Operation
- Installation Considerations
- Maintenance
- Test Procedures
- Troubleshooting

Price/Location/Start Date

- Determined by class size, location & topic

Emergency Standby Power Systems

Course: ET510 **CEU'S:** .7

Overview

This 1-day course provides a comprehensive overview of the components that make up emergency standby power systems. 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:

- Codes and standards for inspection, testing, and maintenance
- Typical problems and solutions

Topics

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

Price/Location/Start Date

- Determined by class size, location & topic

Ground Fault Protection for Low-Voltage Equipment

Course: ET511 **CEU'S:** .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. Such subjects, as these will be covered:

- Common problems and misunderstandings associated with ground fault system applications
- Basic elements of ground fault systems

Topics

- Types of Ground Fault Sensing
- Fault Magnitudes
- System Grounding
- Installation
- Tests and Inspections
- Coordination

Price/Location/Start Date

- Determined by class size, location & topic



Troubleshooting Technician

Course: ET100 **CEU'S: 2.1**

Overview

This 3-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. Successful completion and written examination of these practical exercises is required for certification. Upon completion, students will be able to:

- Analyze diagram types, devices and symbols
- Identify the main focus of the problem
- Implement the initial approach to troubleshooting including testing the instruments
- Identify the operational requirements for breakers, relays, switches, automatic transfer switches, 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

Motor & Motor Control Technician

Course: ET102 **CEU'S: 1.8**

Overview

This 2.5-day course covers the operation and maintenance of both motors and motor controllers. During the course students will be given practical exercises for evaluation. Successful completion and written examination of these practical exercises is required for certification. Upon completion, students will:

- Understand the operation and 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

Substation Technician

Course: ET101 **CEU'S: 3.5**

Overview

This 5-day course involves understanding the operation, maintenance, troubleshooting and application of medium voltage (up to 72.5kV) substations. During the course students will be given practical exercises for evaluation. Successful completion and written examination of these practical exercises is required for certification. Students will learn:

- Safety protection and hazards
- Substation system design
- Substation operation
- Identify substation equipment and maintain it

Topics

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

Price/Location/Start Date

- Determined by class size, location & topic



Protective Relaying Tech

Course: ET104 **CEU'S: 2.1**

Overview

This 3-day course introduces the basic operating concepts of the three basic relays, which are the foundation on which most relaying is based. Anyone who works on or supervises power generation, transmission, or distribution systems would find this course valuable. During the course students will be given practical exercises for evaluation. Successful completion and written examination of these practical exercises is required for certification. At the end of the course, students will:

- Understand the basic tools to manage a relay system and test it
- Make decisions about the suitability, maintenance and testing of relay systems
- Learn safety procedures for power system environment, system interruption, flash hazard and also general safety
- Perform test data procedures

Topics

- Safety
- Sensing
- Language of Protective Relaying
- Testing Concepts and Test Equipment Use
- Recording and Managing Test Data

Price/Location/Start Date

- Determined by class size, location & topic

Protective Relaying Master Tech

Course: ET105 **CEU'S: 3.5**

Overview

A 5-day course which will study the complex relays and protective systems, which will help build upon what was learned in the previous course. Students will spend significant time in a lab environment to experiment with the operation and testing of complex relays. During the course students will be given practical exercises for evaluation. Successful completion and written examination of these practical exercises is required for certification. Students who complete this course will build their knowledge on:

- Decision making regarding suitability, maintenance and testing of relay systems
- Relay theories
- Symmetrical components
- Multiple types of relays

Topics

- Relay Basics & Review
- Vector Theory and Application
- Introduction to Coordination
- Symmetrical Components
- Distribution Relays
- Generation Relays
- Multi Function Relays

Prerequisite

Certified Protective Relaying Technician class

Price/Location/Start Date

- Determined by class size, location & topic

Distribution System Technician

Course: ET103 **CEU'S: 3.5**

Overview

This 5-day class covers the operation and maintenance of low voltage distribution systems with an emphasis on practical skills. During the course students will be given practical exercises for evaluation. Successful completion and written examination of these practical exercises is required for certification. Upon completion students will learn:

- Safety protection and hazards
- System configuration, equipment and maintenance
- Switchboard inspection
- Protection systems
- Guideline codes and standards

Topics

- Safety
- System Design
- Switchboard Inspection
- Operation
- Distribution System Equipment and Maintenance
- Protection Systems
- Guidance

Price/Location/Start Date

- Determined by class size, location & topic



OUR SATISFIED

Boeing Space & Communications

“...Instructor did a great job communicating industry guidelines.”

“...Your training manual and other materials were very good.”

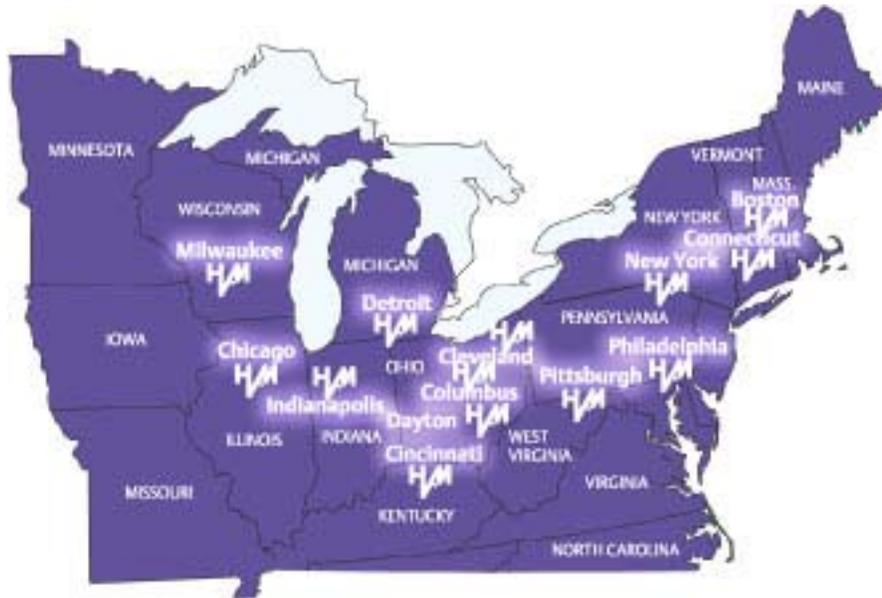
“We are very pleased with the on-site Safety Training classes you provided for our maintenance staff. Your training manual and other materials were very good, and your instructor did a great job communicating OSHA and various other industry guidelines. Every comment from employees who attended the class was positive. We look forward to having you do follow ups, or updates in the future.”

US Borax, Inc.

“...The customized presentations thoroughly covered our needs.”

“Thank you for conducting excellent classes on Confined Space, Low Voltage Breaker Operation and Troubleshooting, and Electrical Safety. The customized presentations thoroughly covered our needs, and the clear instruction enabled our electrical personnel to put the practical information to good use immediately. Your

HVM'S DOMESTIC LOCATIONS



Connecticut

5 Capital Drive
Wallingford, CT 06492
Ph: (203) 949-2650
Fax: (203) 949-2646

Illinois

650 Bonnie Lane
Elk Grove Village, IL 60007
Ph: (847) 228-9595
Fax: (847) 228-9094

Indiana

8320 Brookville Road, Suite E
Indianapolis, IN 46239
Ph: (317) 322-2055
Fax: (317) 322-2056

Kentucky

1455 Jamike Drive, Suite 5
Erlanger, KY 41018
Ph: (859) 371-5355
Fax: (859) 371-5399

Massachusetts

402 High Plain Street
Walpole, MA 02081
Ph: (508) 668-9205
Fax: (508) 668-2142

Michigan

12300 Hubbard Drive
Livonia, MI 48150
Ph: (734) 524-0409
Fax: (734) 524-0410

New York

575 Madison Avenue
Suite 1006
New York, NY 10022
Ph: (718) 239-0359

Ohio

Dayton

5100 Energy Drive
Dayton, OH 45414
Ph: (937) 278-0811
Fax: (937) 278-7791

Cleveland

7200 Industrial Park Boulevard
Mentor, OH 44060
Ph: (440) 951-2706
Fax: (440) 951-6798

Ohio

Columbus

8760 Orion Place, Suite 110
Columbus, OH 43240
Ph: (614) 410-8484
Fax: (614) 410-8500

Pennsylvania

Philadelphia

Ph: (800) 619-0032

Pittsburgh

310 Vista Park Drive
Pittsburgh, PA 15205
Ph: (412) 747-0550
Fax: (412) 747-0554

Wisconsin

3000 S. Calhoun Road
New Berlin, WI 53151
Ph: (262) 784-3660
Fax: (262) 784-5124

Emerson Process Management
High Voltage Maintenance Corp.
Training Services
1380 Greg Street, Suite 223
Sparks, Nevada 89431
Phone: 775.746.8484
Fax: 775.746.4469

©2005 Emerson Process Management

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the designs or specifications of our products or services at any time without notice. The Emerson logo is a trademark and service mark of Emerson Electric Company. The HVM logo is a trade mark and service mark of High Voltage Maintenance Corporation.