Powering industry through education

Expand your knowledge in 2020
Our mission

Eaton strives to provide up-to-date electrical safety, power quality, electrical analysis, OSHA and NFPA 70E training, using the latest codes and standards, not only to our field service engineers, but our customers as well — to help them maintain their equipment and keep personnel safe. We offer classes at our world-class experience centers, customized trailers and customer sites, providing a hands-on, real-world experience.

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Why Eaton?

Eaton’s training programs are developed drawing on over 100 years of experience manufacturing electrical power systems equipment and more than two decades of experience working with customers to install, start up, commission, maintain and modernize Eaton and third-party equipment.

Eaton has one of the largest and most experienced teams of power system engineers and field service professionals in the industry. We provide engineering, preventive maintenance, repairs and consulting services for systems ranging from low voltage to over 34.5kV, focusing on understanding customer requirements and developing strategies for ever-changing business needs.

To provide these services, it is imperative that our engineering team receives constant, up-to-date training to keep power systems running smoothly with maximum uptime in addition to protecting both the equipment and personnel from potential catastrophic events. Offering training to maintenance personnel and engineers is a natural continuation of the expert training we provide our own power system engineers and field service professionals.

World-class training facilities

Located in Warrendale, PA and Houston, TX, our market-specific demonstration centers empower training attendees to experience products within a solution-based application. With applications that step attendees through the power management process from generation all the way down to the receptacle, Eaton’s Experience Centers focus on “pulling back the curtain” to provide an opportunity to see the impact of projects from a broad perspective and dive into operating products, understanding the design, technology and installation practices of a product within that application.

Types of training at the Experience Center

Classroom

Experience Center training focuses on helping visitors understand the theory behind products, solutions and industry standards through:

• Training for knowledge levels from introductory to advanced
• Written and practical assessments available
• Partnerships with industry-leading organizations
• Quality classrooms with state-of-the-art equipment and technology

Hands-on

Eaton recognizes the growing need for personnel to experience real products firsthand, and works to help companies achieve this through:

• Maintaining product integrity in a controlled, safe learning environment
• Providing hands-on training capabilities with energized equipment and distribution systems while delivering product demonstrations for a wide range of markets

Application

The Experience Centers provide the ability for visitors to:

• Experience full-scale applications from petrochemical and industrial to commercial and data center equipment
• Analyze typical power quality problems as they happen on a real power system
• Learn about arc flash solutions
• Learn about various techniques of power system grounding
• Consult with Eaton experts
• Evaluate energy-saving options and set realistic expectations

Accreditations/Certifications

We understand it’s a connected world and students of Eaton’s training courses come for a variety of reasons. That’s why Eaton works with its communities, schools and universities, local unions and organizations to meet students’ diverse needs.

Eaton’s courses offer professional continuing education training credits (CEUs) certified through the Community College of Allegheny County, Pittsburgh, PA. In addition, Eaton’s collaboration with Lone Star College and Project GRAD offers PDHs through industry-focused experiential learning in power management at our Houston experience center.
Experienced instructors

The training is conducted by qualified engineers, many of whom performed power system analysis, startup and maintenance activities on equipment. Some have sat or currently sit on IEEE and other industry boards to help develop safety and product standards.

Eaton’s training team, which includes authors of IEEE technical publications, has an average of 15+ years’ experience in power distribution equipment startup and maintenance and power system analysis. Eaton has one of the largest and most experienced teams of power system engineers and field service professionals in the industry.

**John Coma**

John joined Eaton Engineering Service Division in January 2008 as the Electrical Services Training Manager. He has been responsible for the growth and development of training programs and infrastructure for over 12 years. He has a true passion for the hands-on learning model for adult learners and has been instrumental in the development and implementation of the Pittsburgh and Houston learning centers. John holds a bachelor’s degree in human resource management from Geneva College.

**Eric Chapman**

Eric has five years working for Eaton in the training department as a Training Coordinator. His responsibilities include coordinating logistics for internal and external training classes and ensuring day-to-day operational training needs are met. Prior to Eaton, he spent 10 years of service in customer support and distribution. Eric holds a bachelor’s degree in communications from Clarion University and a master’s degree in public relations from Syracuse University.

**Barry Busbey**

Barry has over 37 years of field experience in the electrical commercial and industrial markets. He has 14 years teaching experience as adjunct faculty at Point Park University in the evenings. Barry has held the position several times as president of the Pittsburgh section of the International Society of Automation. Barry is a graduate of the University of Pittsburgh with a bachelor’s degree in electrical engineering and two master’s degrees — in industrial engineering and education — from Waynesburg University.

**Robert Chronic, P.E., LEED AP**

Robert has 25 years of varied experience from engine controls, data acquisition systems and programming, building mechanical systems design, and commissioning to his current role as an electrical safety training specialist. He earned his bachelor’s and master’s degrees from the University of Florida. Robert’s current role is supporting EESSD safety training curriculum for in-person and online training.

**Tom Dionise, P.E.**

Thomas has 36 years of power system experience involving analytical studies and power quality investigations of industrial and commercial power systems. He regularly teaches classes and seminars on topics related to power quality, harmonics and transient analysis. He has co-authored 40 technical papers on various power quality topics, many of which have received prize paper awards. In 2019, he was elevated to IEEE Fellow for contributions to the mitigation of transients and harmonics in power systems. He is active in many IEEE endeavors, including serving as past chair of the Metal Industry Committee, and member of the Generator Grounding Working Group.

**Don Warham**

Don Wareham is a field application engineer for Eaton in the power systems department. He is a graduate of Penn State University with a degree in electrical engineering and obtained his MBA from the University of Pittsburgh. Don has been with Eaton for over 26 years and has had assignments as a power transformer design engineer, marketing engineer for the large power transformer business, application engineer for the recloser product line and for the last 20 years, has been a field application engineer. As such, Don’s role is supporting customers in the Mid-Atlantic states on Eaton Cooper Power series products such as reclosers, regulators, capacitors, arresters and fuses.
Robert Hulse

Robert has 37 years of experience in the electrical industry as a field service engineer, providing repair, commissioning, consultation and design services to commercial, industrial and utility customers ranging from protection and control systems to high voltage apparatus. Robert joined the training group in 2008, where he provides technical support to course development and acts as an instructor while offering support and consulting to internal service and sales personnel, as well as external customers. He holds a bachelor’s degree in electrical engineering from University of Lowell and holds two U.S. patents.

Kevin Lasch

Kevin has 20 years of field service experience involving low/medium and high voltage equipment. In the training department, he shares his knowledge and experience with not only the new hire classes but also embedded field service representatives. Kevin carries the title of lead subject matter expert for the Hazardous Energy Control program, which is an ongoing educational process that teaches methods and best practices on hazards involved within the electrical field.

Lisa Carnovale

Lisa is the lead power systems engineer and training specialist in Eaton’s Power Systems Engineering group and is responsible for internal training to all new hires in Eaton’s engineering group, Basic Electrical Testing and Switchgear class, and arc flash training. Prior to her training role, she worked for Eaton’s Power Systems Engineering group, performing power systems and arc flash studies. Lisa received her electrical engineering degree from Penn State University.

Kevin Miller

Kevin has five years of power system experience as a field service engineer and technical reviewer. He also has six years of megawatt class turbine experience as a technician and trainer. Kevin graduated from Western Michigan University with degrees in marketing and German. He was a technical trainer for Kalamazoo Valley Community college for five years, including service contracts of production turbines for training purposes.

Peter C. Pietramala, P.Eng.

Peter is currently a Senior Power Systems Specialist with Eaton in the Power System Engineering department. He has over 30 years of experience in both heavy industrial and utility power systems and has specialized in analytical studies in power system switching transients, dynamic analysis, and system planning studies as well as industrial and substation design and industrial, substation, and transmission line protection applications. A paper he co-authored on transient recovery voltage system switching transients, dynamic analysis, and system planning studies received the 2nd Place, 2014 PCIC Prize Paper Award. Peter holds a bachelor’s of electrical engineering degree from the University of Alberta, Edmonton, Alberta and a master’s degree in electrical engineering from the University of Idaho.

Dan O’Reilly

Daniel P. O’Reilly has 32 years of power system experience involving power quality and grounding investigations of industrial and commercial power systems. He has also performed short circuit, protective device coordination and arc flash studies for all types of industrial and commercial customers. He teaches classes related to power quality at Eaton and electrical engineering classes at Point Park University, where he is an adjunct professor in the evenings. He holds a patent for Variable Neutral Impedance for Multi-source Systems. Dan is a member of IEEE.

Mike King

Mike has over 13 years of experience performing short circuit and protective device studies along with arc flash hazard, harmonic, and power quality analysis for generation, commercial and industrial facilities. He holds a bachelor’s degree in electrical engineering technology from the University of Pittsburgh. Mike also managed the design, construction, and rollout of the Eaton Mobile Training Platforms that are currently used to certify Eaton’s field employees. He is currently the lead technical and safety training specialist, developing and instructing classes on short circuit, protective device coordination, field service engineering including startup/maintenance, electrical and arc flash safety, and technical programs.

David J. Porton

David has over eight years of experience performing power distribution equipment field installations and maintenance service on electrical power monitoring systems (EPMS), including the configuration and networking of a power system’s meters, trip units, relays, etc. He received his bachelor’s degree in electrical engineering technology from the Point Park University. David currently develops and conducts training in a variety of electrical safety and equipment maintenance areas.

Zachary Kucera

Zak joined the training team as a customer training specialist for the Eaton training division. He has 11 years of experience in the electrical industrial market and previously spent six years as a Field Service Engineer with the Electrical Engineering Services & Systems division. Zak received a degree in bio mechanics from St. Mary’s University in San Antonio TX.
General training session information

- Several dates are offered for most classes. Registration and payment are required three weeks prior to the class date, depending on class. All prices are per person; group rates are available.

- Travel, hotel and lodging are the responsibility of the attendee. Hotel recommendations will be supplied with your enrollment confirmation.

- Class size varies; you will be notified if your selected class is full and alternate dates are available.

Cancellations

Cancellations for open enrollment classes must be made prior to three weeks in advance of the first day of the scheduled class for a full 100% refund. Cancellations of custom classes and/or on-site classes made prior to three weeks in advance of the day of class will incur a cancellation fee along with any incurred costs to date. All cancellations occurring within three weeks prior to the first day of class will have a 100% cancellation fee.

Rescheduling

Rescheduling of custom classes prior to three weeks in advance of the first day of class will incur a change fee along with any incurred costs to date. A 50% charge will be incurred and any incurred expenses to date will be charged for rescheduling within the three-week prior to start date.

Eaton proprietary statement

Standards, logos and names referenced within are registered trademarks belonging to each of its respective organizations. To offer an education that is non-manufacturer specific, we use Eaton products as well as other major manufactures’ for our hands-on experiences and course-related teachings.
Automatic Transfer Switch (ATS) Startup, Commissioning and Operation

Duration: 4 days
Location: Asheville, NC
Cost: $1,995
Credits: 3.2 CCAC CEUs or 32 PDHs

Target audience
Experienced field service engineers, technicians, and maintenance personnel whose job responsibilities will include commissioning and service of transfer switch equipment.

Learning objective
At the completion of this course, students will be able to perform startup, commissioning and maintenance activities on Eaton’s current-production automatic transfer switches and controllers.

Note
Students should bring their laptop computers, 8 cal/cm² shirts, pants, leather work gloves, and goggles or side-shield safety glasses. This is a product-specific certification training program. Successful completion of practical and written exams is required.

Abstract
Using classroom instruction and laboratory exercises, attendees will learn about the transfer switch equipment that is currently manufactured by Eaton Corp. The classroom will have hardware demonstrators, including type ATC controllers, contactor-type switches and breaker-type switches. Hands-on activity will comprise at least half of the time spent in training activities. Attendees will meet key product line and support personnel. A plant tour will be included.

Class topics include:
General information
- Transfer switch basics, including types of switches, codes and standards, as well as issues related to transfer switch operation
- Application considerations
- Operation and setup of current-production controllers
- Operation, startup and service of contactor type- and breaker-type switches
- Operation, startup and service of the contactor-type, bypass/isolation switches
- Operation, startup and service of Magnum DS-type switches, both standard TSE and bypass/isolation types

To register: See form at the end of the catalog
or visit Eaton.com/electricaltraining
Basic Electrical Testing

Duration: 4 days
Location: Warrendale
Cost: $1,995
Credits: 3.2 CEUs or 32 PDHs

Target audience
Electricians, technicians and engineers who are responsible for electrical testing using various styles of metering equipment.

Learning objective
At the completion of this course, students will learn fundamentals of basic electrical testing required for startup, commissioning and preventive maintenance.

Abstract
Preventative maintenance, startup and commissioning activities require basic electrical tests to be performed to ensure the equipment is in a operable state throughout its life.

A combination of various major manufacturers’ test sets are used to perform practical classwork. Testing will be performed on actual equipment providing the student an easier transition from the classroom to the job.

Basic testing includes:
- Behavior of insulation systems
- Insulation resistance tests
- Dielectric tests
- AC withstand tests
- Vacuum bottle integrity tests
- Low resistance tests
- Secondary injection tests

To register: See form at the end of the catalog or visit Eaton.com/electricaltraining
Basic Protective Relay Testing

Duration: 5 days
Location: Warrendale/Houston/custom site
Cost: $1,995
Credits: 4 CEU or 40 PDH

Target audience
Maintenance technicians, electricians, engineers or any others who are responsible for maintaining a safe and reliable electrical power distribution system in an industrial or commercial facility.

Learning objective
At the completion of this course, students will be able to test the most common IEEE protective relay functions on a variety of manufacturers’ products.

Abstract
Protective relays are used for the electrical protection of distribution equipment such as transformers, substation equipment and electrical transmission lines. Abnormal conditions, phase differentials, overcurrent and overvoltage are topics discussed for prevention of equipment damage and safety. Understanding the functions of Current Transformer (CT) and Voltage Transformer (VT) ratios, polarity and operating principles as they apply to relaying are essential to the relay protection system and are covered in the course. Various manufacturers’ relays will be used for a realistic hands-on reinforcement of classroom-taught material, along with demonstrations for the best experience and education. Review of drawings depicting a range of complexity of relay schemes AC and DC will also be covered.

Class topics include:
- Introduction to basic relays
- Power triangle calculations
- Phasor diagrams
- CT and VT construction and connections as they apply to relaying and metering circuits
- Relay test equipment
- Understanding phase and ground short circuit, detection and safe clearing

IEEE protective functions include:
- AC time overcurrent (51)
- Instantaneous (50)
- Undervoltage (59)
- Overvoltage (67)
- Transformer differential (87T)
- Over frequency (81O)
- Under frequency (81U)
- Sync check (25)

Relay manufacturers and types include:
- ABB CO
- GE IAC
- Eaton DT3000
- ABB CV
- GE IAV
- ABB CR
- ABB Circuit Shield
- Eaton FP5000
Understanding and Overview of LV and MV Electrical Drawings

Duration: 2.5 days
Location: Warrendale/Houston
Cost: $1,495
Credits: 2.0 CEU or 20 PDH

Target audience
Electricians, project managers, field service engineers or technicians whose job responsibilities will include review and editing of electrical drawings.

Learning objective
The goal of this two and a half-day workshop is to have the student become familiar with reading and understanding various drawing types and styles for electrical distribution systems and equipment.

Abstract
Using drawings from various distribution systems and equipment, attendees will learn standard symbols and drawing styles used to represent electrical distribution systems and equipment. Attendees will be able to reference the physical equipment to drawings that will assist in LOTO planning and implementation, startup and commissioning activities, and troubleshooting.

Course topics include:
- Standards
  - IEEE
- Symbols
- Distribution equipment
- Protective devices
- Device numbers
- Types
  - System drawings
  - Single line
  - Riser
  - Impedance
- Equipment-specific
  - Layout
  - Three line
  - Wiring
  - Control schematics

To register: See form at the end of the catalog or visit Eaton.com/electricaltraining
Electrical and Arc Flash Safety

Duration: 1 day
Location: Warrendale/Houston/custom site
Cost: $895
Credits: 0.8 CEU or 8 PDH

Target audience
Electricians, technicians, maintenance workers, engineers, managers and safety professionals who need to follow and adhere to industry and government standards to maintain safe electrical work environments.

Learning objective
At completion of this course, students will be able to avoid working on or near energized equipment. Where exposure cannot be avoided, students will learn to implement safety procedures to minimize dangers adhering to the guidelines of NFPA 70E.

Abstract
Personnel safety is the most important concern in the workplace. The NFPA 70E sets standards for electrical safety in the work environment and keep workers safe while working on or around electrically energized equipment. IEEE 1584 sets the industry standard for evaluating the arc flash hazards in a power distribution system and its equipment. 29CFR1910 subparts R and S tie these standards and governmental regulations for electrical safety together. OSHA mandates regarding electrical safety in the workplace specifically require employer assessment of generally recognized hazards in the workplace, and provisions for protecting the employee from those hazards.

Course topics include:

General information
- Regulations, standards and codes
- OSHA [29 CFR 1910.399 Part 2]
- NFPA 70E-2018
- Your employer’s electrical safety program

Working in a situation where an arc-flash or shock hazard exists
- Electrically safe working condition and exceptions that might justify working around live parts
- Working in a situation where an arc flash hazard exists
- How do power systems engineers determine incident energy and arc flash boundaries
- Classroom exercise — assess the risk of an arc flash

Selecting and using personal protective equipment and insulated tools
- PPE for electrical work
- Selecting arc-rated garments and other PPE for arc flash protection
- Picture examples of arc-rated clothing and other PPE
- Selecting and using insulated tools

To register: See form at the end of the catalog or visit Eaton.com/electricaltraining
Electrical Safety for the Qualified Worker

Duration: 3 days
Location: Warrendale/Houston/custom site
Cost: $1,490
Credits: 2.4 CEU or 24 PDH

Abstract
This course provides workers exposed to electrical hazards with the knowledge and skill sets for electrical safe work practices and lockout/tagout, shock and arc flash hazard assessments, and job hazard analysis as required by OSHA and NFPA 70E. More important, it provides employees with the skills necessary to maintain a safe work environment and return home safely at the end of their day.

This course provides both traditional classroom instruction and hands-on demonstrations of safe work practices. Skill demonstrations and lab exercises include donning PPE, checking for the absence of voltage, creating and executing a LOTO procedure and grounding and establishing an electrically safe work condition. The class ends with practical testing and certification.

Course topics include:
• Electrical safety standards and regulations
• NFPA 70E
• OSHA
• Shock hazards
• Arc flash hazards
• Personal protective equipment
• Job safety analysis
• Lockout/tagout
• Safety-related work practices

Target audience
Electricians, technicians, maintenance workers, engineers, managers and safety professionals who need to follow and adhere to industry and government standards to maintain safe electrical work environments.

Learning objective
Become aware of electrical safety hazards and how to properly address them with protective equipment and eliminate of them where possible.

To register: See form at the end of the catalog
or visit Eaton.com/electricaltraining
Hazardous Energy Control

Duration: 3.5 days
Location: Warrendale/Houston/custom site
Cost: $1,495
Credits: 2.8 CEU or 28 PDH

Abstract
This course teaches engineers and technicians how to recognize and mitigate hazards in the work environment along with methods of controlling additional hazards previously overlooked. The class will contain demonstrations and limitations of metering devices and the how/why they should be used.

Target audience
Engineers, technicians, electricians and managers of employees who are responsible for LOTO and creating and maintaining an electrically safe work environment while performing their daily tasks.

Learning objective
The objective of this safety program is to enable the worker to better understand and define the work location to isolate and mitigate the hazards that exist in their work location.

Course topics include:
- Controlling hazards within your defined work zone
- Provide a systematic approach to develop and implement and adapt LOTO plans
- Equipment used to detect the presence and absence of voltage in low/medium voltage environments
- Selection and placement of grounding equipment in a system according to work zone hazards
- Learning methods of hazard mitigation using conventional and unconventional LOTO
- A comprehensive review of LOTO techniques and equipment available to properly implement

To register: See form at the end of the catalog or visit Eaton.com/electricaltraining
Industrial Power Systems Analysis I

Duration: 4.5 days
Location: Warrendale/Houston/custom site
Cost: $1,995
Credits: 3.6 CEU or 36 PDH

Abstract
Using classroom exercises and demonstrations, this training program reviews the fundamental techniques of power systems analysis. Although it is not intended to teach the use of power systems analysis software, the instructors will use laptop computers in the classroom and review examples to help explain the construction of system single-line diagrams and the calculation of short-circuit current.

Target audience
Power system engineers, field service engineers, application engineers, sales engineers, technicians and others who want a solid understanding of short circuit analysis.

Learning objective
Upon completion of this course, attendees will be able to recognize the several forms of power system single-line diagrams, calculate short-circuit current, and evaluate the application of power circuit breakers and power fuses.

Course topics include:
- Introduction to power systems analysis: basic unit relationships (voltage/current/power); ANSI device/function numbers
- Three-phase power fundamentals: power triangle, power factor, phasor diagrams; the per-unit system
- Distribution equipment: transformers, induction machines, synchronous machines
- Short-circuit analysis: sources of fault current, symmetrical short circuits, modeling a power system, making impedance diagrams
- Unbalanced fault currents: derivation of non-symmetrical phasors from their symmetrical components, positive/negative/zero sequence networks, three-phase vs. single-line-to-ground and line-to-line faults
- Data collection, short-circuit calculations, protective device ratings, device evaluations, main-tie-main closed-transition applications, capacitive switching

To register: See form at the end of the catalog
or visit Eaton.com/electricaltraining
Industrial Power Systems Analysis II

Duration: 3 days  
Location: Warrendale/Houston/custom site  
Cost: $1,490  
Credits: 2.4 CEU and 24 PDH

Abstract
Upon completion of this course, participants will be able to use manufacturer time current curves to coordinate a power distribution system and protect the distribution equipment from available faults and overloads. This program also ensures attendees can use the latest IEEE 1584 equations to calculate the incident energy in an arcing fault situation.

Target audience
Power system engineers, field service engineers, application engineers, sales engineers, technicians and others who want a solid understanding of protective device coordination and arc flash analysis.

Learning objective
This course will verify and validate technical knowledge of engineers who perform or would like to perform power system analyses on a regular basis. Upon successful completion, attendees will be able to identify the settings of protective devices to properly protect a power distribution system per the National Electric Code (NFPA 70), demonstrate coordination analysis skills in a small power distribution system by reading manufacturers’ time current curves and drawing system time current curves, and apply IEEE and NFPA standards at various locations within a power distribution system to calculate the incident energy during a worst case arc flash event.

Course topics include:
• Equipment damage curves  
• Protective device curves  
• Arc flash analysis  
• Time current curves

To register: See form at the end of the catalog or visit Eaton.com/electricaltraining
Overcurrent Protection

Duration: 3 days
Location: Warrendale/Houston/custom site
Cost: $1,495
Credits: 2.4 CEU or 24 PDH

Target audience
Any engineer who is involved with design or operation of overcurrent protection schemes for utilities or industry will benefit. The workshop will be more beneficial for those who have a working knowledge of overcurrent protection devices.

Learning objective
At the end of this course students should be able to coordinate fuses, sectionalizers and reclosers.

Abstract
Like no other workshop, this one provides a combination of experienced engineers, hands-on-learning, and technical information as well as a comprehensive reference manual.

Eaton offers the unique combination of real-world, everyday problem-solving skills and instructors with extensive hands-on field experience.

The reference materials binder, specially prepared for this course, is a thorough resource written by Eaton Power Systems engineers, and includes practical information to help you accomplish your day-to-day objectives.

Course topics include:
- Fuse-to-fuse expulsion and current-limiting coordination
- Transformer fusing protection
- Protection with sectionalizers
- Recloser and sectionalizers coordination
- Recloser and load-side coordination
- Electronically and hydraulically controlled recloser coordination
- Exposure to CYME™ power engineering software
- Overcurrent relay coordination with fuses and reclosers

To register: See form at the end of the catalog or visit Eaton.com/electricaltraining
Overvoltage Protection

Duration: 2 days
Location: Warrendale
Cost: $1,295
Credits: 1.6 CEU or 16 PDH

Target audience
The workshop is designed for utility distribution engineers or any engineer who is involved with design or implementation of overvoltage protection schemes for utility distribution systems.

Learning objective
The goal of this two-day workshop is to explain how various overvoltage protection schemes are designed and to instruct how to solve practical and realistic overvoltage problems.

Abstract
Learn how to economically prevent excessive transient overvoltages from damaging electric utility distribution systems equipment or interrupting normal power system operation in this course. Problems allow students to explore standard and extraordinary conditions where standard overvoltage protection applications may not be effective.

Students will learn how to make overvoltage protection schemes as effective as possible within given economic constraints. Installations of actual utility distribution equipment in Eaton’s Power Systems Experience Center are used to illustrate a variety of surge arrester applications and the protected equipment, as well as demonstrate concepts and transient phenomena.

Course topics include:
• Basic overvoltage protection
• Basic Insulation Level (BIL)
• Insulation coordination
• Sources of system over-voltages
• Arrester fundamentals
• Application of arresters and other over-voltage protection schemes
• Distribution equipment protection
• Overhead and underground systems protection
• Substation protection
• Switching transients
• Low voltage surge protection

To register: See form at the end of the catalog or visit Eaton.com/electricaltraining
Power Quality Monitoring and Analysis

Duration: 2.5 days
Location: Warrendale, Houston
Cost: $1,495
Credits: 1.6 CEU or 16 PDH

Target audience
This training program is recommended for any field service engineer, field service technician, power systems engineer or power systems automation engineer who performs power quality surveys or collects data for power quality investigations.

Learning objective
Find and pinpoint power quality issues, measure them and use proven methods for correcting them.

Abstract
This course teaches engineers and technicians how to diagnose power quality problems and perform measurements of sags, swells, voltage transients, harmonic distortion and voltage flicker. More than half of the time in this training program is dedicated to hands-on practice using a variety of popular models of portable and panel-mount power monitors. Students are also encouraged to bring their own analyzers to learn new uses for them in our Power Systems Experience Center.

Course topics include:
• Power quality fundamentals — disturbances, harmonics, transients, grounding, example waveforms, equipment tolerances, ITIC, IEEE 519-2014, and IEC standards
• Techniques for identifying and analyzing power quality problems
• Actual case studies and their real-world solution
• Build your own equipment tolerance diagram
• Monitoring transients, subcycle disturbances and flicker
• Monitoring harmonics
• Evaluating power quality problems using power monitor data
• Special considerations for making measurements in high-resistance grounded distribution systems and delta-wye power transformer circuits

Note
Bring your laptop. All other classroom supplies will be provided. This program will be taught by engineers of the EESSD Power Systems Engineering and Performance Power groups.

To register: See form at the end of the catalog or visit Eaton.com/electricaltraining
Switchgear Maintenance

Duration: 4 days
Location: Warrendale
Cost: $1,995
Credits: 3.2 CEU pr 32 PDH

Abstract
Using classroom and training laboratory exercises, attendees learn how to classify switchgear and switchgear components. Nameplate ratings for circuit breakers and switchgear assemblies are discussed and identified on actual equipment. Maintenance of switchgear assemblies and assemblies components is discussed along with how to properly maintain power circuit breakers and molded case breakers.

Target audience
Experienced field service engineers or technicians whose job responsibilities will include commissioning and service of all types of switchgear.

Learning objective
At the end of this four-day workshop, students will be able to perform startup, commission, and preventive maintenance activities on various switchgear assemblies.

Course topics include:
- Inspection of Magnum DS circuit breaker and test of Digitrip 1150+
- Magnum DS LV power circuit breaker — measurements of insulation resistance and primary circuit resistance
- Verifying the performance of a zone interlocking scheme in a Magnum DS assembly
- Functional testing of arc flash reduction maintenance mode — Digitrip 520MC
- Magnum DS switchgear, circuit breaker racking, hoisting, phase-displacement checks at the bus tie
- Interlocks and controls — VacClad-W switchgear
- Door interlocks of an arc-resistant VCP-W assembly, MR2 motorized remote racking device, closure measurement
- Testing and inspecting medium-voltage control-power and instrument transformers
- Commissioning inspections and tests for a TRITON SL Ampgard
- Inspection of Ampgard medium voltage, FVNR, type SJA
- Inspection of an MSB switch

To register: See form at the end of the catalog or visit Eaton.com/electricaltraining
Transformer Startup and Maintenance

Duration: 5 days
Location: Warrendale
Cost: $1,995
Credits: 4.0 CEU or 40 PDH

Target audience
Experienced field service engineers or technicians whose job responsibilities will include commissioning and service of all types of transformers.

Learning objective
The goal of this five-day workshop is to have the student become familiar with transformer styles, general startup procedures and necessary maintenance procedures.

Abstract
Using classroom and training laboratory exercises, attendees learn how to perform commissioning and maintenance tests on unit substation and power transformers.

Students will become familiar with transformer basics such as standard operating principles and standardized terminal markings. Construction characteristics, inspections and tests of dry-type and liquid-immersed transformers will be discussed.

Course topics include:
- Insulation resistance measurements
- Power-factor of insulation measurements using Doble M4000; transformer winding, bulk bushings, condenser bushings
- Turns ratio tests
- Inspection of gas pressure, oil temperature, winding temperature, liquid level, primary and secondary pressure-relief devices, cooling fans, oil boosters
- Interpreting gas-in-oil analysis reports
- Laboratory sessions:
  - Sampling of insulating fluids
  - Sampling of gas expansion space
  - Doble M4000 exercises
  - Testing a fault-pressure relay
  - Troubleshooting fan control

To register: See form at the end of the catalog
or visit Eaton.com/electricaltraining
Eaton’s EESSD Mobile Training Platform (EMTP)

Customizable training on one of two available EMTPs

Who should use the EMTP?
Managers and engineers looking for hands-on safety, maintenance, and operation training of electrical distribution equipment.

Learning objective
Learn from experienced experts in a collaborative and interactive environment. The EMTPs contains the equipment of an entire distribution system in a trailer capable of being delivered to your location. This allows for a cost effective method of training by eliminating travel of your employees.

What to expect?
The Eaton EMTP requires a relative flat area 80ft x 16ft. Upon arrival of the trailer, an Eaton representative will set it up and prepare it for your training session. At the end of the training, your Eaton trainer will close the trailer and prepare it for transport.

Eaton trainers are subject matter experts in safe operation and maintenance of electrical distribution equipment. Eaton’s EMTP allows hands-on activities in addition to traditional classroom-style training.

Equipment on the EMTPs include:

**Trailer One:**
- Medium voltage fused switch
- Low voltage Magnum DS switchgear
- Switchboards
- Panelboards
- Bolted pressure switch
- Automatic transfer switch

**Trailer Two:**
- Medium voltage fused switches
- VCPW switchgear
- Low voltage Magnum DS switchgear with NRX breakers
- Panelboards
- Dry type transformer
- AmpGard starter

For more information, email EESSDTraining@eaton.com
### Participant Information:

<table>
<thead>
<tr>
<th>Customer ☐</th>
<th>Employee ☐</th>
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</thead>
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- **First Name, MI:** __________________________
- **Last Name:** __________________________
- **Company Name:** __________________________
- **Email:** __________________________
- **Phone:** __________________________
- **Fax:** __________________________

<table>
<thead>
<tr>
<th>Customer __________________________</th>
<th>Employee __________________________</th>
<th>Trainer __________________________</th>
</tr>
</thead>
</table>

- **Title:** __________________________
- **Address:** __________________________
- **City:** __________________________
- **State, Zip Code:** __________________________

### Course Information:

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Location</th>
<th>Cost</th>
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### Employee Payment Method Information:

**NOTE:** Payment must be rendered at the time of registration. All training orders will be invoiced upon completion of the training.

**If paying by PO, please allow us to enter the order in Vista to ensure proper tracking and credit.**

- **Vista Customer #:** ________________

**Or if Paying by Credit Card, provide the following information:**

- **Type of Card:** Am Ex ☐  MC ☐  Visa ☐  
- **Credit Card #:** __________________________
- **Name on Card:** __________________________
- **Expiration Date:** __________________________
- **Billing Address:** __________________________
- **City:** __________________________
- **State, Zip Code:** __________________________

### Customer Payment Information:

**NOTE:** Payment must be rendered at the time of registration. All training orders will be invoiced upon completion of the training.

- **Type of Card:** Am Ex ☐  MC ☐  Visa ☐  
- **Vista Customer #:** ________________
- **Credit Card #:** __________________________
- **Name on Card:** __________________________
- **Expiration Date:** __________________________
- **Billing Address:** __________________________
- **City:** __________________________
- **State, Zip Code:** __________________________

**Or if paying through an authorized Eaton Distributor, please provide the following information:**

- **Distributor’s Name:** __________________________
- **Vista Customer #:** ________________
- **Address:** __________________________
- **Address 2:** __________________________
- **City:** __________________________
- **State, Zip Code:** __________________________
- **Phone:** __________________________
- **Fax:** __________________________

### Signature:

- **Applicant’s Signature:** __________________________
- **Date:** __________________________