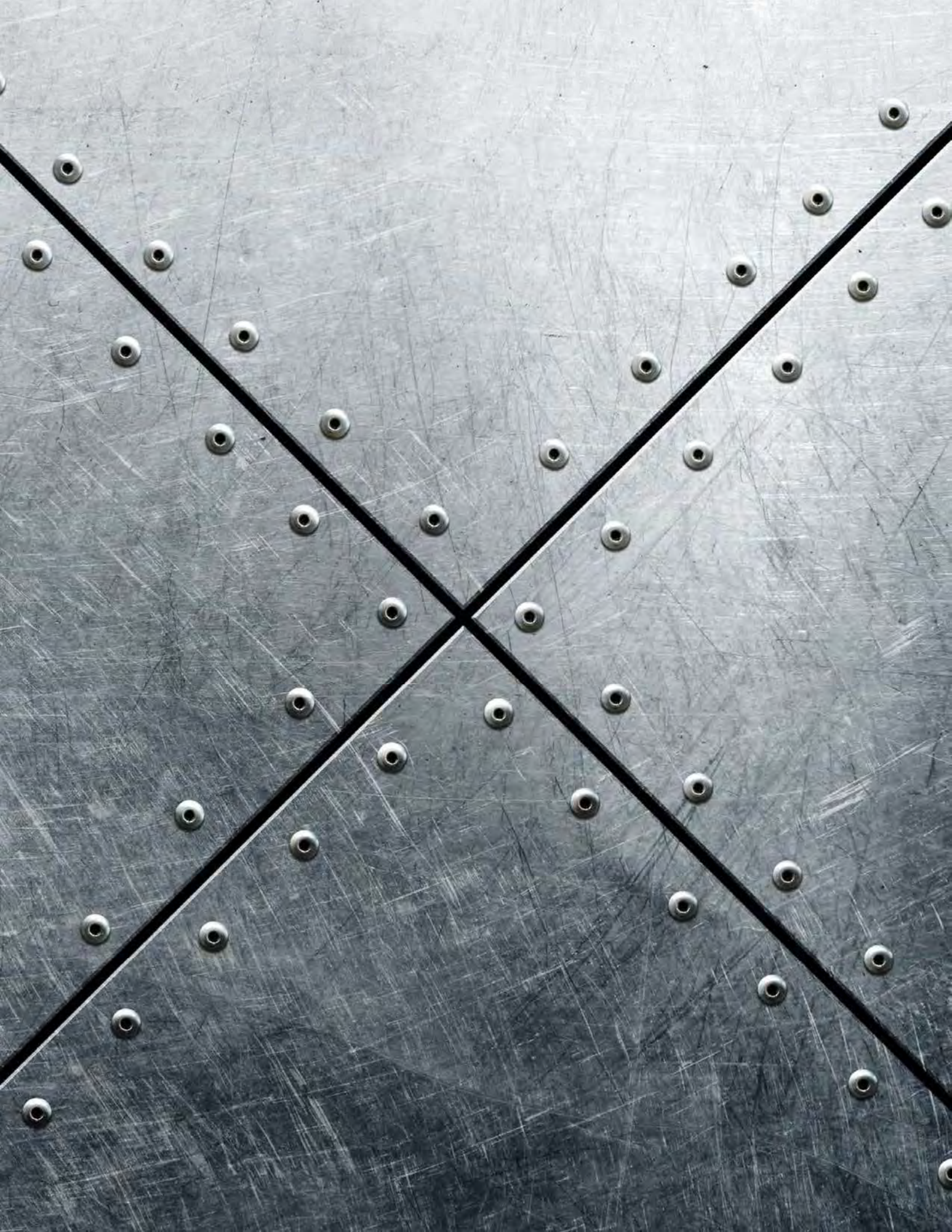
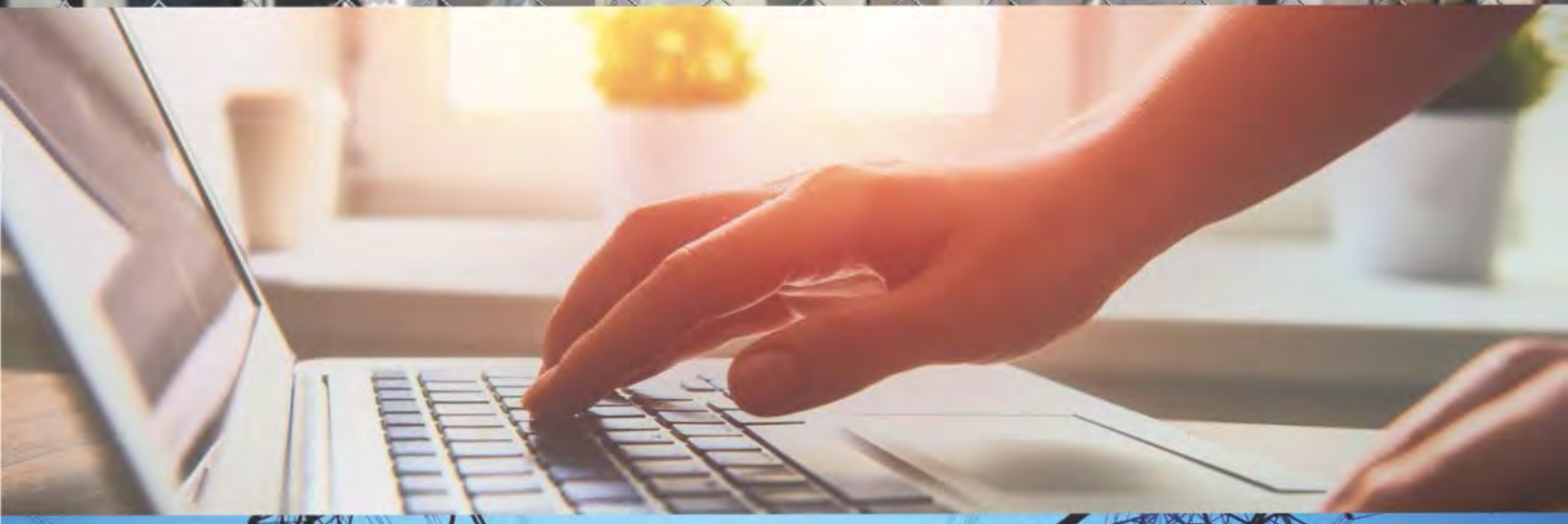

2021–2023 COURSE CATALOG




DANGER
HIGH VOLTAGE
KEEP OUT




DANGER
BUS IS ENERGIZED TO 2300 VOLTS WHEN RED LIGHT IS FLASHING!
DANGER
HIGH VOLTAGE KEEP OUT
DANGER
- WARNING -
FUSES MAY BE ENERGIZED BY BACKFEED

# INSIDE SHERMCO UNIVERSITY

## SHERMCO UNIVERSITY DIFFERENCE

Shermco U is the industry's trusted knowledge bank for electrical safety and hands-on electrical maintenance training. Because Shermco's heritage is electrical power system testing and maintenance, our instructors offer real world field experience that keep people safe while developing on the job skills. We offer the most complete course delivery systems, including custom development, because we understand the types of training industry needs and the way it's needed.

## ELECTRICAL & MAINTENANCE SAFETY TRAINING

Because of our vast experience with CSA, IEEE, NFPA, NETA, EASA, AWEA and other organizations, we develop comprehensive training electrical courses. In fact, many of our staff help write the standards of the courses they instruct.

## COMPUTER-BASED TRAINING

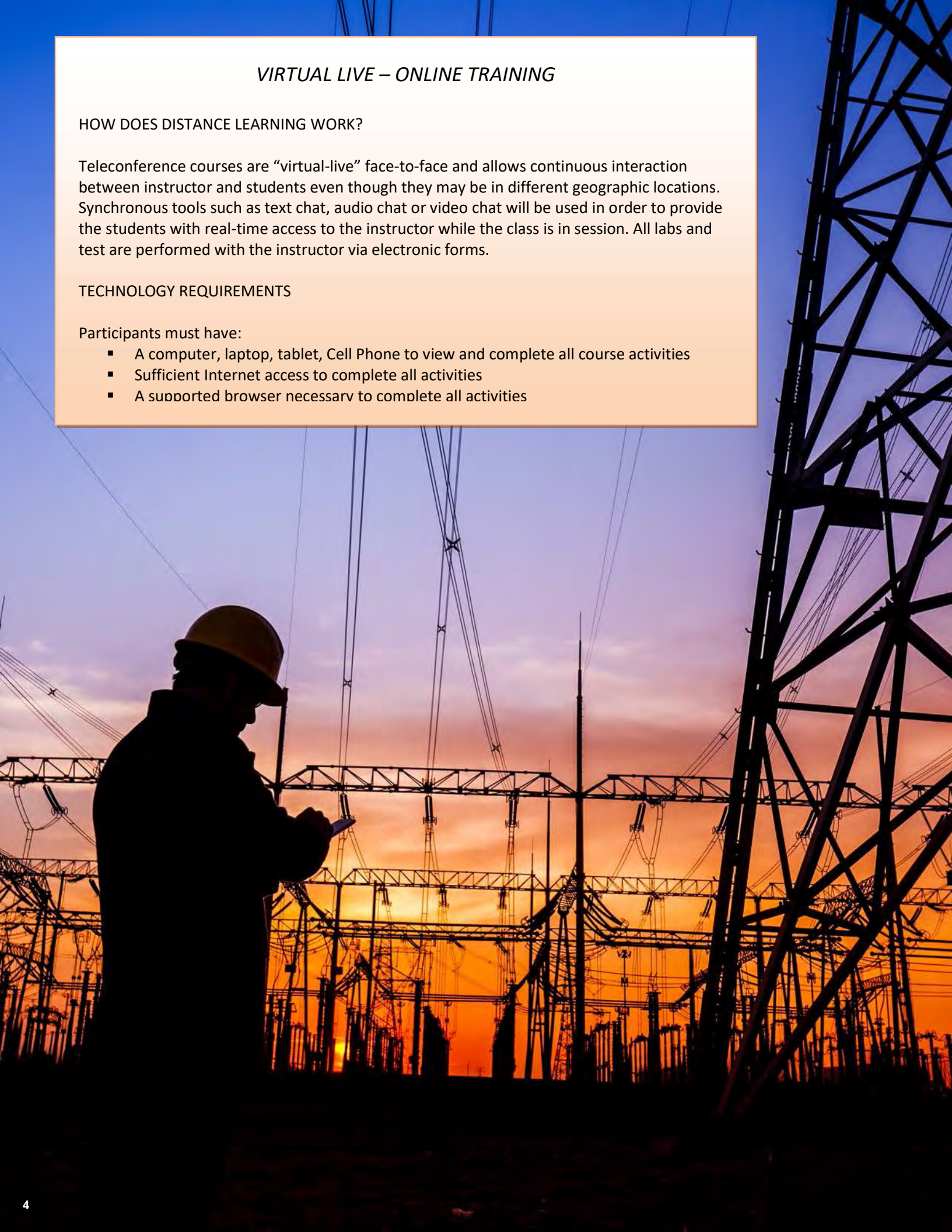
We understand that the job must go on. That's why we have developed the most complete suite of supplemental computer-based training programs you'll find anywhere. These convenient courses are packed with information because we know that you have a job to do.

## VIRTUAL LIVE - ONLINE TRAINING

Shermco U provides virtual live training, providing the courses via PC, tablet or smartphone. All classes are conducted with live instructors ensuring instant communication, understanding of materials, and class participation as equal to being in person.

## ONSITE TRAINING

When you can't come to us, we can come to your facility. It's not always easy to have staff away for their essential training requirements. That's why we bring Shermco U to you. It allows workers to train on the equipment they use every day and they are there if you need them.



## *VIRTUAL LIVE – ONLINE TRAINING*

HOW DOES DISTANCE LEARNING WORK?

Teleconference courses are “virtual-live” face-to-face and allows continuous interaction between instructor and students even though they may be in different geographic locations. Synchronous tools such as text chat, audio chat or video chat will be used in order to provide the students with real-time access to the instructor while the class is in session. All labs and test are performed with the instructor via electronic forms.

TECHNOLOGY REQUIREMENTS

Participants must have:

- A computer, laptop, tablet, Cell Phone to view and complete all course activities
- Sufficient Internet access to complete all activities
- A supported browser necessary to complete all activities

# ELECTRICAL SAFETY CONSULTING

## SAFETY COMPLIANCE SOLUTIONS

Our field service orientation gives us an advantage over most engineering and consulting firms. We continually train and audit for safety compliance within our own organization. We use that knowledge to assist you in eliminating hazardous conditions and to comply with the standards.

## SITE SAFETY ASSESSMENT

The Site Safety Assessment determines whether the policies, procedures, training and work practices are adequate to meet OSHA®, MSHA,® and NFPA® 70E requirements. A cross-section of workers and supervisors are interviewed to determine their understanding of regulatory requirements and safe work practices. This Site Safety Assessment also incorporates the Electrical Safety Program Review.

## ELECTRICAL SAFETY PROGRAM DEVELOPMENT

Shermco will develop and implement a comprehensive program to ensure safe work practices and compliance. Electrical Safety Program (ESP) elements include: purpose and policy, responsibilities, employee training requirements, inspections and audit standards, equipment standards, standard operating procedures for electrical work, personal protective equipment requirements, and labels and signs.

## ELECTRICAL SAFETY TRAINING

What good is an electrical safety program if workers don't know how to use it? To be considered a qualified electrical person, OSHA® expects workers to meet the definition of 1910.399, the requirements of 1910.332 and 1910.333. In short, that person would have to have safety training, demonstrate specific skills during that training and also be skilled in the technical aspects of a task. Shermco's electrical safety training program provides the mandated electrical safety training required to meet OSHA regulations.

# NORTH AMERICA TRAINING CENTERS


**Austin, TEXAS**
1705 Hur Industrial Blvd.
Cedar Park, TX


**CALGARY, AB**
7015 8th St. NE
Calgary AB


**CHICAGO, ILLINOIS**
1705 Hur Industrial Blvd.
Cedar Park, TX


**DALLAS, TEXAS**
2425 E. Pioneer Dr.
Irving, TX


**DES MOINES, IOWA**
5154 NW Beaver Dr.
Johnston, IA


**EDMONTON, AB**
3731 98 St.
Edmonton, AB


**HOUSTON, TEXAS**
3807 S. Sam Houston Pkwy W
Houston, TX


**PHOENIX, ARIZONA**
2231 E Jones Ave.
Phoenix, AZ


**REGINA, SK**
1033 Kearns Crescent
RMof Sherwood, SK


**ST PAUL, MINNESOTA**
3807 S. Sam Houston Pkwy W
Houston, TX

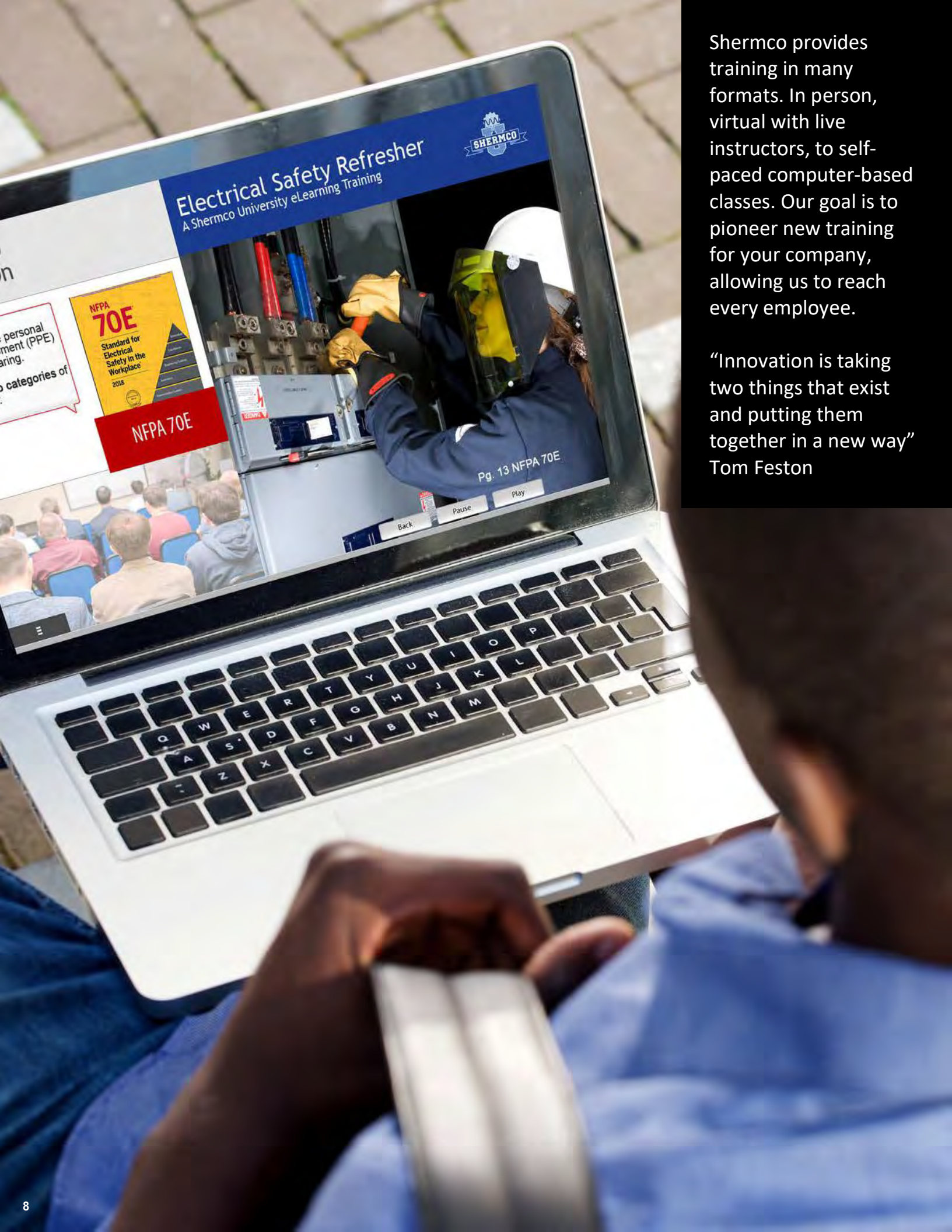

**ST PAUL, MINNESOTA**
998 E. Berwood Ave.
Vadnais Heights, MN


**SWEETWATER, TEXAS**
1301 Hailey St.
Sweetwater, TX


**TULSA, OKLAHOMA**
4510 South 86th East Ave.
Tulsa, OK


**VANCOUVER, BC**
#370 – 233 West 1st St.
North Vancouver, BC


**WINNIPEG, MB**
1375 Church Ave.
Winnipeg, MB




Shermco provides training in many formats. In person, virtual with live instructors, to self-paced computer-based classes. Our goal is to pioneer new training for your company, allowing us to reach every employee.

“Innovation is taking two things that exist and putting them together in a new way” Tom Feston

# COMPUTER-BASED TRAINING


## ADD CONVENIENCE TO TRAINING PROGRAMS

Our computer-based e-learning courses are developed to supplement our hands-on instructor-led training. These online courses contain robust modules that are packed with information on the topics listed below.

## BUNDLE TO DESIGN THE CURRICULUM FOR SPECIFIC TRAINING REQUIREMENTS

- AC Motor Theory
- AC Motor Types
- AC Reactive Elements: Power Factor Correction
- Arc Flash Mitigation Techniques
- Battery Maintenance & Testing
- Cable Splicing & Termination
- Circuit Breaker Maintenance & Testing
- Construction & Failure Mechanisms
- DC Motors
- Electric Motors
- Electrical Power Distribution Systems
- Fundamentals of Electricity (7-part series)
- Grounding & Bonding
- Introduction to Circuit Breakers
- Low & Medium-Voltage Switches
- Medium-Voltage Cable Construction
- Medium-Voltage Cable Testing & Diagnostics (3-part series)
- Motor Starting Methods
- Protective Relays
- Sf6 Switch Operation & Maintenance
- System Grounding Methods
- Transformer: Power Factor & Tip Up Testing (2 part series)
- Transformer Testing: Oil Tests
- Transformer Testing: Dissolved Gas Analysis
- Transformer Testing: Sweep Frequency Response Analysis
- Transformer Testing: Turns Ratio Testing
- Transformer Testing: Winding Resistance Measurements
- Transformers: Demagnetization Of Power Transformer Cores
- Transformers: Excitation Current Test (2 part series)
- Understanding Time Current Curves
- Working Principles of a Transformer

# ELECTRICAL SAFETY TRAINING COURSES

## UNDERSTANDING NFPA 70E (2021 edition)

**In Person 1 DAY $575 •Virtual 1 DAY $550**

This training program is an in-depth study of the NFPA 70E requirements in Chapters 1 and 2. NFPA 70E has a huge impact on your company's operations. Don't guess at what the 70E means; get the right information from the source. This course was developed by NFPA 70E committee members and is constantly updated with the latest changes as proposed by the Committee. 2021 edition is covered, including important changes. Each open-enrollment student will receive a copy of NFPA 70E.

### PREREQUISITES

Students should have basic electrical training and knowledge.

### COURSE LEARNING OBJECTIVES

- How to use the 70E effectively and how it's structured
- General safety requirements for electrical safety-related work practices
- Training requirements for qualified and unqualified persons
- Establishing an electrically safe work condition
- Lockout/tagout (LOTO) of electrical equipment
- Approach boundaries, shock and arc flash
- PPE categories and Tables 130.5(C), 130.5(G), 130.7(C)(15)(AB&C)
- Safety-related maintenance requirements for overcurrent protective devices (OCPD)
- NFPA 70E requirements for work on or near exposed energized conductors and circuit parts
- Selection of PPE based on NFPA 70E using the tables or when an arc flash study must be performed
- Understand the requirements of an Electrical Safety Program (ESP) and how to implement one
- Understand the changes to the NFPA 70E 2021
- Seminar-based program with round-table discussions

## ELECTRICAL SAFETY FOR QUALIFIED WORKERS

**In Person 2.5 DAYS $850 • Virtual 2 DAYS $830**  

Designed for all maintenance and testing personnel who work on or near electrical equipment. This seminar meets and exceeds the basic OSHA mandated electrical safety training. All of the concepts of electrical safety are carefully explained in both classroom and hands-on sessions. These assure that the skills and knowledge can be demonstrated to meet the OSHA requirements. The basic class and lab are primarily focused on applications below 600 volts, but an optional one-day lab session is available for understanding and demonstrating the special skills and knowledge required for medium- voltage applications.

### PREREQUISITES

Attendees should have basic electrical training and field experience recommended but not mandatory.

### COURSE LEARNING OBJECTIVES

- Recognize, understand and avoid electrical hazards and risks (shock, arc flash and arc blast)
- How to develop and implement a JSA/JHA to address hazards and plan the required steps needed to work safely on or near energized conductors and circuit components.
- Safe work practices for work on or near metal clad switchgear, substations, motor control centers, medium-voltage motor starters and facility electrical systems.
- How to place equipment in an electrically safe work condition and properly utilize lockout/tagout (LOTO) requirements.
- Proper selection, maintenance, testing, use and storage of PPE. Learn their purposes and limitations.
- How to inspect insulated tools and understand their limitations of use
- How to select and apply temporary grounds as well as specific equipment grounding hazards including step and touch potentials
- How to use a transformer short circuit current/incident energy calculator and how to estimate incident energy under field work conditions
- How to perform absence-of-voltage testing to ensure an electrically safe work condition
- Review OSHA Electrical Safety Related Work Practice regulations (29CFR 1910.311-.335 as well as Articles 110, 12 and 130.
- Understand the current utilization of NFPA 70E and the annex tables Seminar-based program with round-table discussions

## LAB SESSION - ELECTRICAL SAFETY FOR QUALIFIED WORKERS

**In Person 1 DAY $575 • Virtual 1 DAY $550**

Technicians and supervisors are often hesitant to perform tasks on medium-voltage equipment without some prior training or experience. This one-day lab session pulls all the pieces together for planning and executing specific tasks on medium-voltage energized equipment. A planning session is followed by hands-on practice in Shermco's training substation under the supervision of our instructors.

### PREREQUISITES

Electrical Safety for Qualified Electrical Workers training course.

### COURSE LEARNING OBJECTIVES

- Focusing on medium-voltage applications
- How to assemble all the components of an electrical safety program into a practical job plan
- Hazard identification and risk assessment
- Absence of voltage testing of medium-voltage switchgear
- Grounding of medium-voltage switchgear
- Changing medium-voltage air-switch fuses
- Inserting and removing (racking) medium-voltage circuit breakers
- Inspection of PPE and arc-rated clothing

## ELECTRICAL SAFETY FOR MANAGERS

**In Person 1 DAY $575 • Virtual 1 DAY $550**

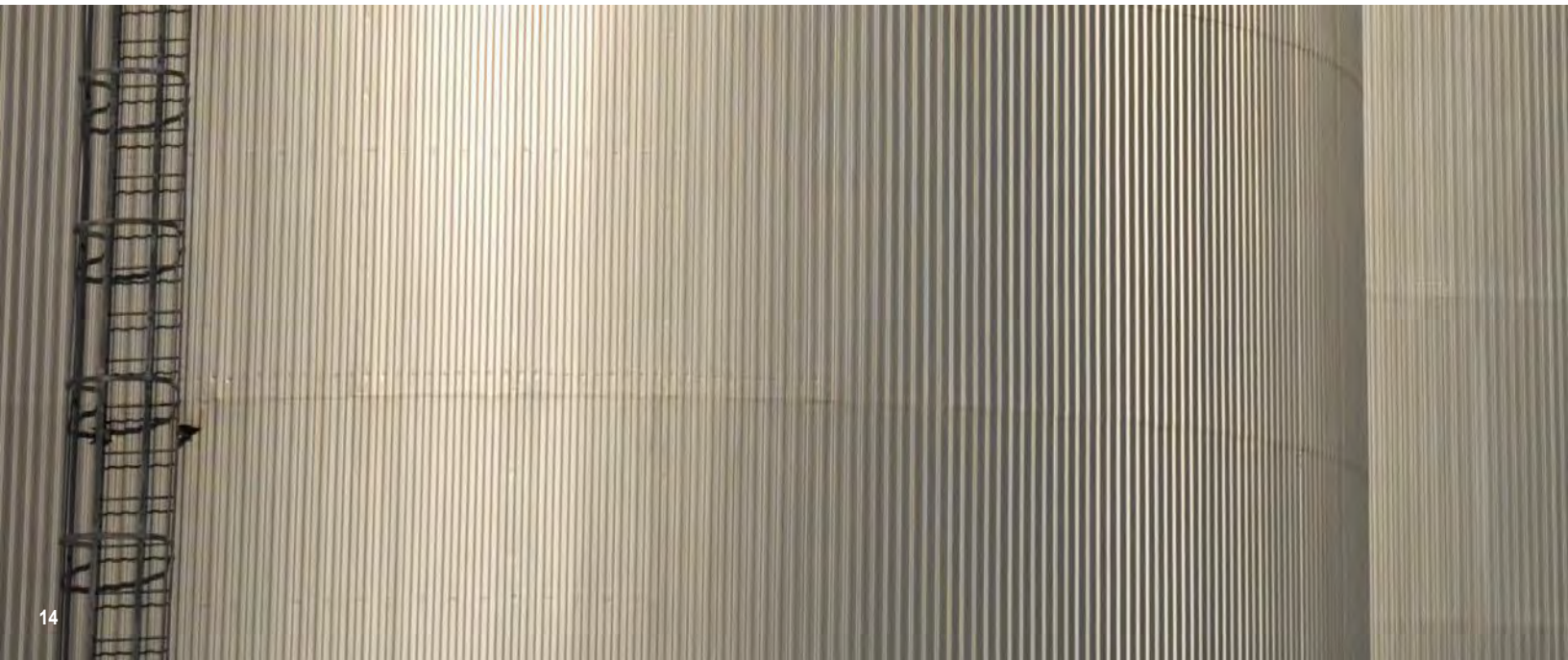
As is often the case, supervisors, managers and engineers who are responsible for plant maintenance are not actually the individuals performing hands-on maintenance operations. However, it is critical that they understand workplace safety policies and regulations so they can plan for the direction and training requirements of maintenance staff and assure that proper PPE, LOTO and other safety procedures are well understood and followed.

**PREREQUISITES**

No prerequisites.

**COURSE LEARNING OBJECTIVES**

- How electrical hazards in the can affect your personnel, your company and those responsible for electrical workers
- Recognize electrical safety hazards and plan a course of action to address each one
- OSHA regulations and NFPA 70E requirements for taking specific measures to prevent electrical hazards from causing injury or death
- Electrical hazard awareness and recognition
- Managing liability created by electrical hazards
- Designing and implementing an Electrical Safety Program (ESP) including policies, safe work procedures and permits, hazard analysis, risk assessments and reduction, training, personal protective equipment (PPE) and other written program documents
- Performing an electrical hazard/risk analysis
- Using the NFPA 70E to interpret hazard/risk category classification (HRC) of a given task and assure adequate PPE
- How to incorporate changes implemented by the NFPA 70E update
- Identify the steps needed to protect employees who work on or near energized parts



## ELECTRICAL SAFETY FOR NON-ELECTRICAL PERSONNEL

**In Person 1 DAY $575 • Virtual 1 DAY $550**

Virtually every worker on an industrial or commercial job site works with or uses electrically powered equipment. Most of these workers have no concept of the hazards they could possibly be exposed to by performing common, everyday tasks. Jewelry contacting energized components, overstressed power strips, coffee pots and heaters placed into the workplace all can increase the risk to the employee and to production if the worker is not aware of the potential issues involved. This course covers common situations that could place the non-electrical worker into dangerous situations.

**PREREQUISITES**

No prerequisites.

**COURSE LEARNING OBJECTIVES**

- Review of electrical hazards, their causes and the potential for injuries and fatalities
- Understand how to avoid these hazards
- Common situations that can increase risk to workers
- OSHA's electrical safety-related work practices regulation as it applies to non-electrical personnel
- Understand electrical LOTO and the Safe Work Zone
- Understand applicable OSHA regulations for non-electrical workers
- Understand and apply NFPA 70E requirements for unqualified persons
- Understand the safe approach distances for shock, arc-flash, arc-blast and the purpose of a safe work zone

This course is designed to meet the training requirements in NFPA 70E Section 110.2(A)(1)(C)(2).

## ELECTRICAL SAFETY REFRESHER

**In Person 1 DAY $575 •Virtual 1 Day $550**

This one-day class is designed for those who have previously met the OSHA mandated training requirements of NFPA 70E and need to be re-certified It is a concise review of the concepts and practices required for safe electrical work.

**PREREQUISITES**

Attendees should have completed OSHA-mandated electrical safety training.

**COURSE LEARNING OBJECTIVES**

- Electrical hazards and safety procedures for work on metal-clad switchgear, substations, motor control centers and facility electrical systems
- Proper selection, maintenance and use of required personal protective equipment (PPE)
- Energized and de-energized work policy and lockout/tagout (LOTO) requirements
- Safe use of portable electrical equipment, including inspection and testing
- Review of OSHA Electrical Safety-Related Work Practice regulations (29CFR1910.331-.335) as well as Articles 110, 120 and 130 of the NFPA 70E

This course is designed to meet the training requirements in NFPA 70E Section 110.2(D)(3).

## ELECTRICAL SAFETY FOR UTILITIES

**In Person 2 DAYS $850 • Virtual 2 DAYS $830**

Electrical utility workers are exposed to live energy hazards every day, often at high voltages. Understanding the impact of these hazards and implementing the best practices for managing projects and tasks is critical to the safety of both personnel and equipment. This hands-on course is designed to address those special requirements and techniques.

### PREREQUISITES

Attendees should have basic electrical knowledge. Field experience with generation, transmission, and distribution systems operating above 600 volts is desired but not required.

### COURSE LEARNING OBJECTIVES

- Electrical hazard awareness including the relationship between electrical hazards and personal injury or death
- Work rules such as determining safe approach distances for exposed energized conductors and components based on OSHA's 29CFR1910.269, and National Electrical Safety Code (NESC)
- The proper use of special precautionary techniques, personal protective equipment (PPE), insulating and shielding materials and insulated tools for working on or near exposed energized parts of electric equipment based on OSHA and NESC
- How to inspect PPE such as rubber insulating gloves, hot sticks, rubber blankets, hard hats, face shields and arc flash clothing, grounding devices
- Absence-of-voltage testing using contact and non-contact devices
- Lecture augmented with discussions; lab time (written and hands-on).

**NOTE:** Employees who work primarily with systems and equipment operating below 600 volts should enroll in Shermco's Electrical Safety for Qualified Electrical Workers Course.

## WIND ENERGY TECHNICIAN SAFETY

**In Person 3 DAYS $1025 • Virtual 3 DAYS $995**

A practical and intensive training program designed to enhance attendees' safety while working on or near a collector system and substation equipment. Safety training requirements and safe work practices for electrical workers are covered using the NFPA 70E, NESC, and Fed OSHA regulations including 29CFR1910.331-.335 and selected parts of 29CFR1910.269. PPE covered in this class includes hard hats, safety glasses, arc-rated vs. FR clothing, arc-rated flash suits, insulated hand tools, live-line tools, rubber insulating gloves and rubber insulating blankets. Classroom lectures will be supplemented with tests and practical exercises intended to reinforce best practices for operations and safety.

### PREREQUISITES

Basic electrical knowledge.

### COURSE LEARNING OBJECTIVES

- Equipment overview & electrical safety basics
- Hazards of electricity
- Personal protective equipment (PPE) & inspecting PPE
- Medium-voltage detection exercise pad-mounted transformer isolation exercise substation switching exercise
- Arc flash and shock boundaries
- Safeguards for personnel protection & job hazard/safety analysis
- Placing equipment in an electrically - safe work condition
- Hazards of de-energized equipment
- Testing for the absence of voltages

## WIND GENERATION SITE OPERATIONS

**In Person 4.5 DAYS $1450• Virtual 4.5 DAYS $1,405**

This course provides wind farm technicians and supervisors with a thorough understanding of wind farm electrical systems from the turbine to the substation utility connection. Classroom discussion and instruction includes the particular safety concerns of working in an environment that has voltages from 690 V up to 500 kV. Workers at wind generation sites require a full understanding of electrical hazards and safe work practices used to protect them from shock and arc flash dangers. Classes can be extended to include practical field exercises in topics like pad-mount transformer switching, substation switching, and substation safety.

### PREREQUISITES

Basic knowledge of electrical systems. Attendees should bring their assigned PPE to the class for use in the labs and practical exercises.

### COURSE LEARNING OBJECTIVES

- Wind farm electrical system overview
- Electrical hazard awareness
- Personal protective equipment
- Electrical safe work practices
- Substation walk-through (on-site only) (conditions permitting)
- Lab session on air switch operation (on-site only) (conditions permitting)
- Overview of operation and maintenance
- Substation grounding
- Personal protective grounding
- Relays & Battery systems
- Lab session on grounding (if available)
- Pad-mounted transformer (if available)
- Lab session on operation of PMT isolation switch (if available)

# ELECTRICAL MAINTENANCE TRAINING

## SUBSTATION MAINTENANCE 1 (CIRCUIT BREAKERS, BATTERIES & GROUNDING)

**In Person 4 DAYS $1,795 • Virtual 3.5 Days $1,450**

This class provides the information and hands-on training to test and maintain most of the major components of the substation except for the main transformer and protective relays. It includes Hands-on (~40%) training augmented with round-table discussions

### PREREQUISITES

Students should have basic electrical training, some field experience and basic knowledge of switchgear.

### COURSE LEARNING OBJECTIVES

- Theory, construction and operation of common types of medium-voltage metal-enclosed switchgear and circuit breakers, including air-magnetic and vacuum
- Interpret ratings and nameplate data to identify breaker ratings and limitations
- Understand how medium-voltage circuit breakers operate, and know the primary causes of failure
- Safety requirements when operating, racking, testing or maintaining breakers
- Required testing and maintenance of medium-voltage metal-enclosed circuit breakers and switchgear in accordance with ANSI/NETA MTS
- Tests commonly performed on circuit breakers and their associated switchgear
- Maintain station batteries in accordance with ANSI/NETA MTS
- Ground testing theory and interpreting test results in accordance with ANSI/ NETA MTS
- How to download and distribute Schweitzer (SEL) relay event fi

### HANDS-ON LAB SESSIONS

- Racking circuit breakers
- Perform and evaluate common circuit breaker electrical tests including insulation resistance, DC overpotential, contact resistance, insulation power factor and timing utilizing equipment from a variety of manufacturers
- Perform routine maintenance on medium-voltage air and vacuum circuit breakers
- Perform clamp-on ground test and interpret the results
- Test and evaluate battery systems
- Perform fall-of-potential ground test and interpret results

## SUBSTATION MAINTENANCE 2 (TRANSFORMERS & RELAYS)

**In Person 4 DAYS $1,795 • Virtual 3.5 Days $1,450**

This course is designed to introduce the design and operation of these large three-phase transformers including how to test and maintain them for maximum reliability. It will also include how to test a selection of substation protective relays, how to interpret the results of those tests and how to properly maintain the relay components.

### PREREQUISITES

Students should have basic electrical training, some field experience and basic knowledge of switchgear.

### COURSE LEARNING OBJECTIVES

- Theory, construction and operation of three-phase power transformers
- How to interpret ratings and nameplate data
- Required testing and maintenance of dry-type and liquid-insulated power transformers in accordance with ANSI/NETA MTS
- How to perform electrical testing of power transformers and interpret test results
- Theory and operation of protective relays, including overcurrent, over/undervoltage and differential
- What tests and maintenance are typically performed on the protective relays in accordance with ANSI/NETA MTS
- How to interpret the test results
- How to download and distribute Schweitzer (SEL) relay event fi
- Hands-on (~40%) training augmented with round-table discussions

## LOW & MEDIUM-VOLTAGE CIRCUIT BREAKER MAINTENANCE & TESTING

**3.5 DAYS • 2.8 CEU • $1,475**

Many industrial customers choose to perform general testing and maintenance on incoming utility substations and downstream substations within the plant perimeters. Both technical competence and proper safety practices are critical to these procedures. This class provides the information and hands-on training to test and maintain most of the major components of the substation except for the main transformer and protective relays.

### PREREQUISITES

It is recommended that students have basic electrical training, some field experience and basic knowledge of switchgear.

### COURSE LEARNING OBJECTIVES

- Theory, construction and operation of common types of medium-voltage metal-enclosed switchgear and circuit breakers, including air-magnetic and vacuum
- How to interpret ratings and nameplate data and identify breaker ratings and limitations
- Understand how medium-voltage circuit breakers operate, and know the primary causes of failure
- Safety requirements when operating, racking, testing or maintaining circuit breakers
- Required testing and maintenance of medium-voltage metal-enclosed circuit breakers and switchgear in accordance with ANSI/NETA MTS
- Tests commonly performed on circuit breakers and their associated switchgear
- How to maintain batteries in accordance with ANSI/NETA MTS
- Ground testing theory and interpreting test results in accordance with ANSI/ NETA MTS

### HANDS-ON LAB SESSIONS

- Racking circuit breakers
- Perform and evaluate common circuit breaker electrical tests including insulation resistance, DC overpotential, contact resistance, insulation power factor and timing utilizing equipment from a variety of manufacturers
- Perform routine maintenance on medium-voltage air and vacuum circuit breakers
- Perform clamp-on ground test and interpret the results
- Test and evaluate battery systems

## SPLICING & TERMINATION OF MEDIUM-VOLTAGE CABLES

**4 DAYS • 3.2 CEU • $2,175** 

Modern cable construction and splicing materials rely on the technician's ability to properly prepare cables and install cable components. Due to the high electrical stresses in these systems, many early life failures may be experienced if cables are not properly terminated or spliced. This course introduces modern cable splicing techniques and materials. We provide an in depth understanding of controlling electrical stresses and cable construction with more than half of the class time spent with hands-on splicing and terminating of cables.

### PREREQUISITES

Students should have basic electrical training, some field experience and basic knowledge of medium-voltage power systems.

### COURSE LEARNING OBJECTIVES

- Basic electrical principles and construction of common types of medium-voltage cables
- Cable construction basics
- Cable theory
- Failure modes
- Cable preparation
- Testing and evaluation of power cables
- Splices and terminations
- Hands on lab sessions where students construct several types of splices and terminations

## SWITCHGEAR OPERATIONS, SAFETY & TROUBLESHOOTING FOR OPERATORS

**2 DAYS • 1.6 CEU • $875** 

Students will learn the electrical operating and control systems of a variety of low and medium-voltage circuit breakers, switches, motor control centers and contactors. Topics will include safety, operation, troubleshooting and correcting operating problems to ensure safe, correct and reliable operation.

### PREREQUISITES

Students should have basic electrical training, some field experience and basic knowledge of switchgear.

### COURSE LEARNING OBJECTIVES

- How to read and interpret electrical drawings related to circuit breaker operation and their interaction with power systems
- How to use electrical drawings to troubleshoot and correct problems
- Learn sequential electrical operation of a variety of solenoid and stored energy breakers
- Electrical and mechanical features, functions and operation of circuit breakers
- Diagnose problems, determine level of corrective action required, and learn who should perform corrective actions
- Routine maintenance and testing of low- and medium-voltage circuit breakers in accordance with ANSI/NETA MTS Standard for Maintenance Testing Specifications
- Theory and operation of test equipment
- Insulation and contact resistance testing
- High potential and vacuum bottle testing
- Primary and secondary injection testing
- Read and understand time/current curves
- Functions, features, maintenance and testing of breaker cells and auxiliary systems
- Evaluate contracted work, understand and correctly interpret repair orders, maintenance work and test reports
- A hands-on training program (~50% when held at Shermco facility, Irving, TX and other select locations) augmented with round table discussions

## INDUSTRIAL PLANT ELECTRICAL MAINTENANCE

**In Person 4 DAYS $1,475 • Virtual 4 Days $1,420**

This course covers what maintenance personnel and managers should know about electrical maintenance and how it affects plant reliability. The maintenance and testing required for common plant devices, including transformers, protective relays, circuit breakers, cubicle maintenance, motors and motor controls is covered in detail. Based on the NFPA 70E or B and ANSI/NETA Maintenance Testing Specifications, this intensive training program provides the latest information on maintaining and testing electrical power system equipment, including what to do, when to do it and interpreting test results.

### PREREQUISITES

Students should have basic electrical training. Some field experience is recommended but not mandatory.

### COURSE LEARNING OBJECTIVES

- Low- and medium-voltage circuit breakers
- Motor maintenance
- Switches and disconnects
- Transformer maintenance and testing
- How to interpret results and trend analysis
- How to improve plant reliability through common-sense approaches to operation and maintenance
- How to lower operation and maintenance cost
- How maintenance planning can reduce unscheduled downtime
- Hands-on (~40%) training program augmented with round-table discussions

## MOTOR MAINTENANCE & TESTING

**In Person $1,375 3 DAYS • 2.4 CEU • $1,375**

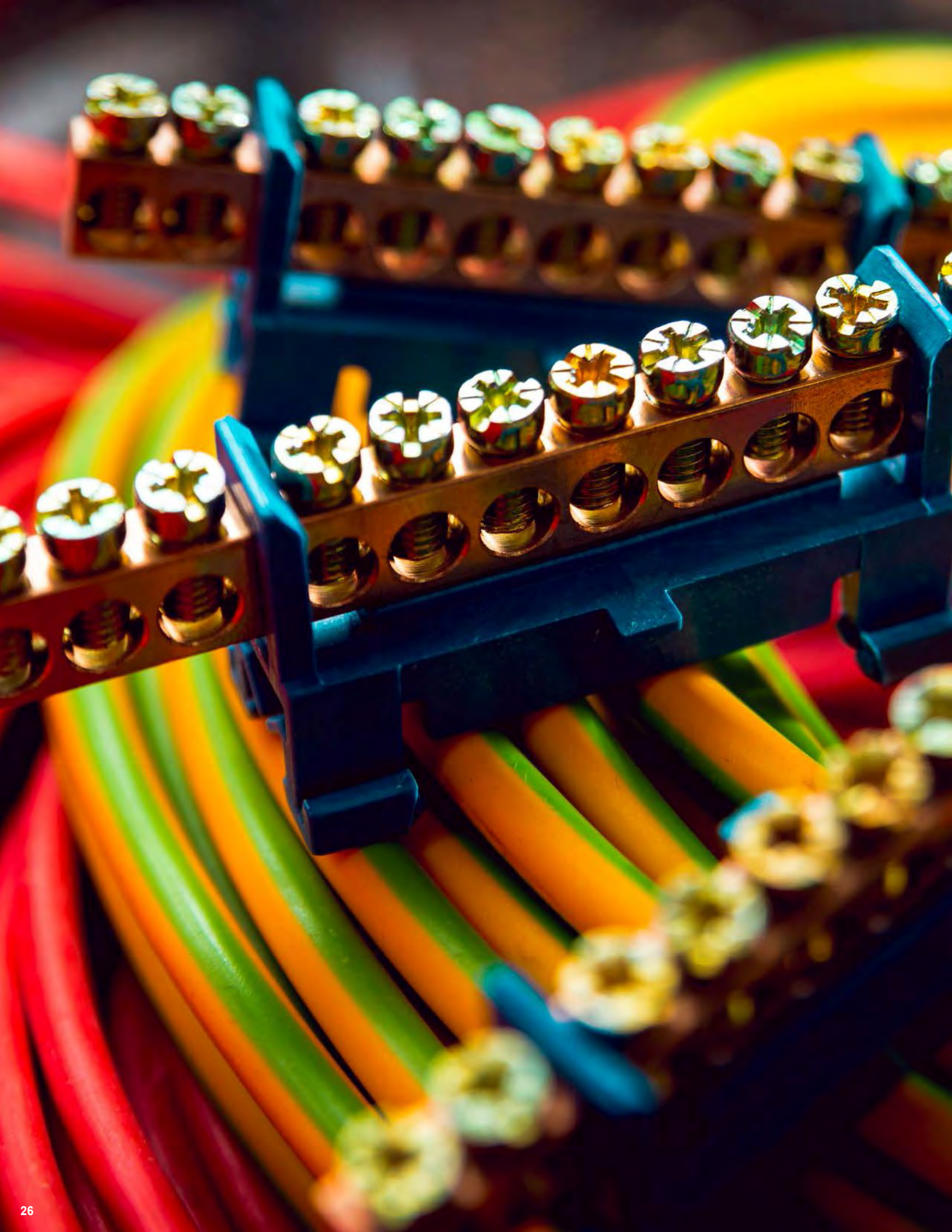
This course is designed to provide electrical technicians and maintenance managers with a fundamental understanding of electric motors: how they work, how they break and what maintenance strategies can improve uptime performance. Both electrical and mechanical tests, and how they are interpreted, are reviewed including hands-on skills training and assessment. These analytical tests are critical for troubleshooting and are at the core of a comprehensive predictive maintenance program (PdM) for rotating machinery in commercial, industrial and utility operations.

### PREREQUISITES

Basic electrical training, some field experience and basic knowledge of rotating machinery.

### COURSE LEARNING OBJECTIVES

- Basic theory, construction and operation
- Interpreting motor nameplates and NFPA 70B requirements
- Mechanical and visual inspection procedures for motors
- Preventive (PM) and predictive (PdM) motor maintenance procedures
- Bearing failure causes and how to correct them
- Hands-on (~30%) training augmented with round-table discussions



# BASIC ELECTRICAL FUNDAMENTALS

## BASIC ELECTRICAL FUNDAMENTALS

**2 DAYS • 1.6 CEU • $995**

Whether you are new to the industry or are taking on additional responsibilities for electrical maintenance, a solid knowledge of the basics is essential to understanding the operations, maintenance and safety of any facility or factory site. This is a hands-on practical introduction to those concepts and skills that serves as a prerequisite to further training and career enhancements for both technicians and managers.

### PREREQUISITES

None.

### COURSE LEARNING OBJECTIVES

- Fundamentals of matter, energy and electricity
- Direct current (DC) fundamentals, including Ohm's Law and calculating voltage, current, resistance and power in the DC systems
- Battery theory and operation
- Alternating current (AC) fundamentals, including application of Ohm's and Kirchoff's Laws to single- and three-phase circuits
- How AC is generated
- Inductance, capacitance and reactance
- How transformers work

## BASIC ELECTRICAL TECHNICAL SKILLS

**3 DAYS • 2.4 CEU • $995**

A companion course to Basic Electrical Fundamentals, this course features a detailed, hands-on training regimen on the use of electrical testing equipment, electrical system trouble-shooting and interpretation of electrical drawings. These are the basic skills required by any technician to safely and efficiently maintain and operate electrical equipment.

### PREREQUISITES

Attendees must have a solid understanding of basic electricity acquired through classroom/OJT or completion of Shermco's Basic Electrical Fundamentals training program.

### COURSE LEARNING OBJECTIVES

- How to use Digital Volt Ohm Meters (DVOMs) to safely test a variety of components
- Interpret nameplates and data plates of common electrical devices
- Proper method for operating switches and circuit breakers
- Explanation and use of overcurrent protective devices, molded-case circuit breakers and low-voltage power circuit breakers
- Effectively troubleshoot electrical control and power circuits
- The basic understanding of electrical drawings and prints
- Safe work practices for voltage testing, megohmmeters and micro-ohmmeters

## TROUBLESHOOTING & ELECTRICAL PRINT READING

**2 DAYS • 1.6 CEU • $840**

This fundamental course was developed for technicians and managers who need to understand electrical power systems: how they are designed, what can go wrong and how to find the problem areas. Several types of drawings and schematics are explained, and hands-on exercises will demonstrate their practical use for basic troubleshooting.

### PREREQUISITES

Attendees should have basic electrical training; some field experience is recommended but not mandatory.

### COURSE LEARNING OBJECTIVES

- Types of electrical system drawings, the basic layout and the purpose of each
- Legends used on electrical drawings
- Understanding and identify typical electrical symbols
- Standard ANSI/IEEE device numbers
- How circuits and devices interact with each other
- To understand the "logic" functions in electromechanical control systems
- To troubleshoot electrical problems using elementary diagrams, one-line diagrams and schematics
- To understand device functions and system operations such as circuit breaker and motor controls and transfer schemes
- Hands-on (~30%) training program augmented with round-table discussions, and perform practical exercises using elementary diagrams, one-line diagrams and schematics.

## NATIONAL ELECTRICAL CODE 2017

**3 DAYS • 2.4 CEU • $1,320**

This course is designed to give new or experienced users of the National Electrical Code (NFPA70) practical experience in applying the rules in commercial and industrial applications. Through practical exercises, classroom instruction, and discussions, students will learn how to size conductors, motors, overcurrent protection and raceways for safe installations. Students will utilize chapters 1 through 4 of the Code book to become proficient in finding applicable sections for most applications. Chapter 9 tables are also covered so students can properly utilize them in everyday work situations. The practical exercises are designed to help students become familiar with the structure of the Code and how to quickly find the articles needed for common applications.

### PREREQUISITES

An understanding of basic electrical theory and practical field knowledge of electrical installations. This is not a basic or beginner's NEC training course.

### COURSE LEARNING OBJECTIVES

- Purpose, scope, and definitions of the NEC
- Requirements for installations wiring and protection
- Load calculations and overcurrent protection
- Wiring methods, conductors, and Conductors in parallel
- Underground installations
- Raceway and box fill calculations
- Conductors in parallel
- Conductor ampacity correction and adjustment
- Bonding and grounding Article 250
- Switchboards, switchgear, and panelboards
- Neutral conductor terminations
- Motors, motor circuits, and controllers

## FUNDAMENTALS OF PROTECTIVE RELAY TESTING & MAINTENANCE

**4 DAYS • 3.2 CEU • $1,520**

Protective relay calibration requires specific skills and knowledge. Often, technicians are given a test set, an overcurrent relay and an instruction book and told to figure it out. This creates uneven knowledge and can lead to very expensive mistakes. Even OJT in this area can have problems if the person conducting the OJT does not have a full knowledge of the subject and/or poor communication skills. Shermco's relay training starts with the basics and progresses through instrument transformers, overcurrent, over/under voltage electromechanical relays, then to solid-state and digital relays.

### PREREQUISITES

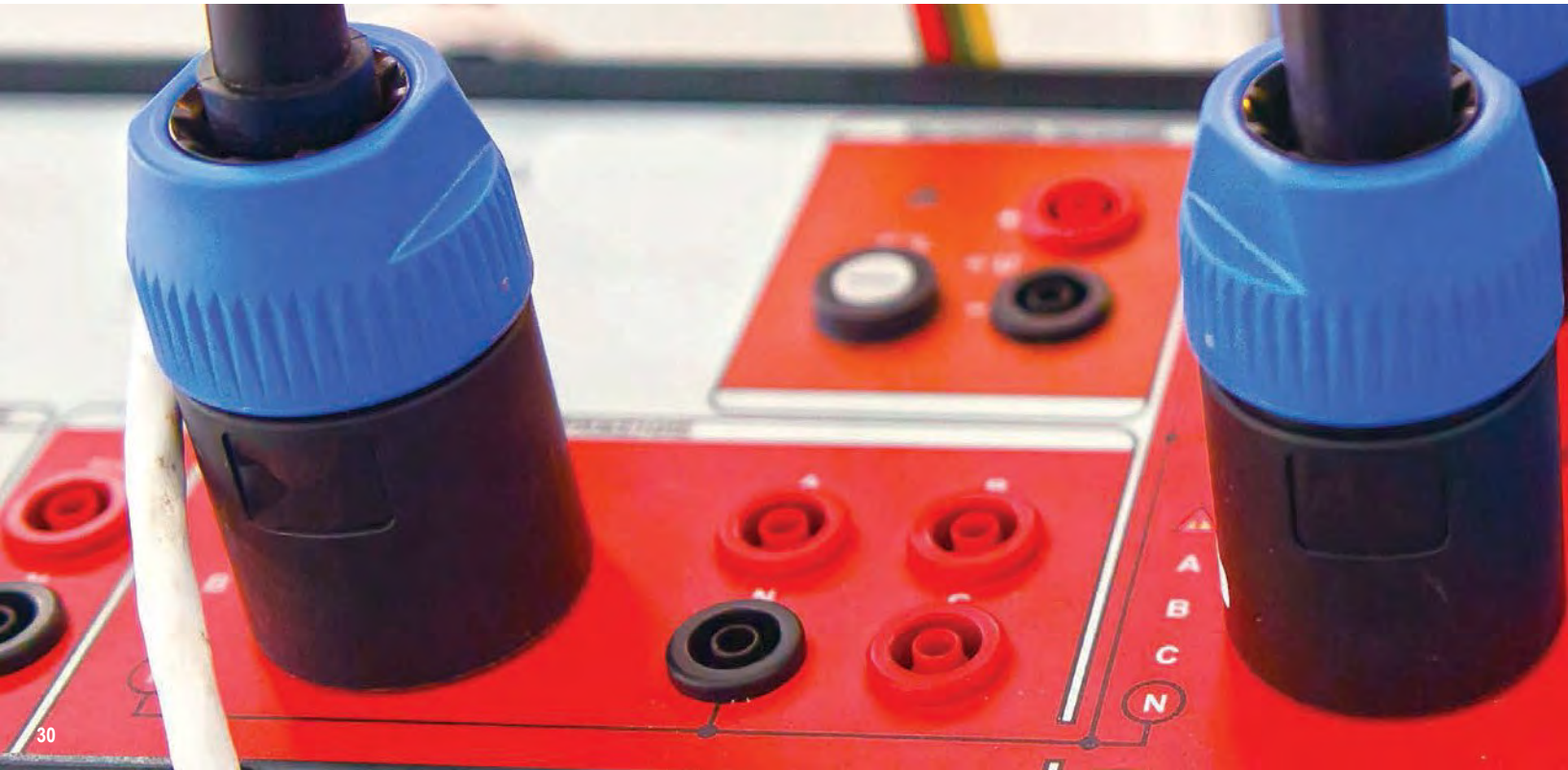
Attendees should have a good understanding of electrical theory and principles and some field experience.

### COURSE LEARNING OBJECTIVES

- Operating principles, theory and application of common relays
- Operating principles and theory for current and voltage transformers
- Safety precautions for testing and maintaining protective relays
- How to maintain protective relays and look for common problems
- Interpreting protective relay internal schematics
- Proper testing procedures for protective relays
- Perform tests on electromechanical, solid-state and digital relays
- How to access digital relays to download information, such as events and error codes

### RELAYS COVERED

- Overcurrent relays, over/under-voltage relays, phase balance relays, percentage differential relays, and motor protection relays



## INTRODUCTION TO SEL RELAYS

**2 DAYS • 1.6 CEU • $820**

This class provides hands on training to communicate with SEL protective relays and a basic understanding of SEL relay logic. The class will cover how to read and set SEL logic and focus on how to download Serial Event Recorder (SER) data and waveforms.

### PREREQUISITES

Attendees should have a good understanding of electrical theory and principles and some field experience.

Due to the wide range of software available, we cannot guarantee the exact software or firmware used at your location will be available. Computers with the software provided will be supplied for the class. Attendees are encouraged to bring their own computers and load the software on their computer during the class.

### COURSE LEARNING OBJECTIVES

- Basic understanding for SEL Logic
- Operation of Acselerator QuickSet Software
- How to log into SEL relays with no risk of changing settings.
- How to change or modify settings
- How to communicate with different SEL relays
- How to program and download the Serial Event Recorder (SER)
- How to download waveform captures from the relay
- How to interpret waveform and SER data

### RELAYS COVERED

- SEL 701 Motor Protection relay and SEL 751 Feeder Protection relay

# TRAINING IN CANADA

## QUALIFIED ELECTRICAL WORKER TRAINING

**2 DAYS • 1.6 CEU • $1,195.00 CDN** CANADA ONLY

Let us teach your employees to identify electrical hazards; assess risks and implement risk control according to a hierarchy of methods. This two-day course exceeds and adheres to CSA Z462-18 and the Occupational Health and Safety Regulations. In addition, we provide hands-on training, which includes the operation and safety of power systems equipment in our 53' mobile training trailer.

**PREREQUISITES**
Basic electricity knowledge.


## ELECTRICAL SAFETY FOR NON-ELECTRICAL WORKERS

**1 DAY • 0.8 CEU • $425 CDN** CANADA ONLY

This 8-hour course concentrates on educating non-electrical personnel on how to understand electrical hazards and the risks associated with energized equipment. This course will teach your employees to assess the hazards, control exposure and reduce the risks associated.

**PREREQUISITES & LAB TIMES**
No prerequisites. This course is seminar-based with no hands-on labs.

## QUALIFIED ELECTRICAL WORKER REFRESHER

**1 DAY • 0.8 CEU • $425 CDN** CANADA ONLY

This one-day course is designed for those who have completed the Qualified Electrical Worker training course and require the refresher course for updates on CSA Z462-18 and other current regulations and standards.

**PREREQUISITES & LAB TIMES**
Requires previous completion of the QEW training course. This course is seminar-based with no hands-on labs.

## ELECTRICAL MAINTENANCE PLANNING

**1 DAY • 0.8 CEU • $695 CDN** **CANADA ONLY**

Participants will understand the maintenance and testing requirements for key components in an industrial electrical system. They will learn how to determine a maintenance strategy for electrical equipment in order to minimize unscheduled outages by improving equipment reliability and keeping your employees safe in accordance with CSA Z463.

This course is intended for managers, technicians, supervisors, field engineers, plant engineers and others who determine the scope and schedule the maintenance, testing and evaluations on industrial switchgear, distribution cables, protection systems, circuit breakers, ground systems, battery banks and transformers.

Lab Time & Prerequisites: Hands-on training (± 20%) program augmented with round-table discussions. The student should have basic knowledge of AC/DC electricity.

Option to purchase copy of CSA Z463 for $125 CDN

## BATTERY BANK TESTING

**2 DAYS • 1.6 • $1195 CDN** **CANADA ONLY**

This training course will introduce students to stationary batteries and the maintenance and testing they require. The student will learn to identify various types of batteries, their construction and applications. The student will define safety and hazards related to batteries and testing. We will look at various failure modes related to batteries and how to identify each failure. Tests and inspection procedures will be explained along with the interpretation of test results.

This hands-on course is intended for technicians, fi personnel, electricians, supervisors and engineers who supervise employees who perform inspections or maintenance work on battery banks.

Lab Time & Prerequisites: Hands-on training (± 20%) program augmented with video and round-table discussions. Attendees should have basic electrical training. Some field experience is also recommended, but not mandatory.


## CIRCUIT BREAKER MAINTENANCE & TESTING

**2 DAYS • 1.6 CEU • $ PLEASE CONTACT** **CANADA ONLY**

Participants will understand the maintenance and testing requirements for key components in an industrial electrical system. They will learn how to determine a maintenance strategy for electrical equipment in order to minimize unscheduled outages by improving equipment reliability and keeping your employees safe in accordance with CSA Z463.

This course is intended for managers, technicians, supervisors, field engineers, plant engineers and others who determine the scope and schedule the maintenance, testing and evaluations on industrial switchgear, distribution cables, protection systems, circuit breakers, ground systems, battery banks and transformers.

**PREREQUISITES**

Lab Time & Prerequisites: Hands-on training (± 20%) program augmented with round-table discussions. The student should have basic knowledge of AC/DC electricity.

# IF IT'S IN THE POWER SYSTEM, SHERMCO DOES IT.

Shermco University's heritage is electrical power systems testing and maintenance for utilities and industry. Our training courses were born from the DNA that decades of field experience provides. We take that on the job know how to the classroom, lab, and online. Our students leave with enhanced skills they can take to the job. We know it and we teach it because we've seen it.

Since 1974, Shermco has become North America's largest and fastest growing NETA-accredited electrical testing organization. Our focus is to make sure electrical power systems are functioning properly and safely. Add to that our professional engineering group, rotating machinery division, renewable energy services, field repair and local repair service centers, it places Shermco in a position to handle all things electrical. All done with an emphasis on safety and client service.

## SHERMCO'S CORE SERVICE AREAS INCLUDE:

**POWER SYSTEMS MAINTENANCE & TESTING**

**PROTECTION & CONTROL**

**ENGINEERING SOLUTIONS**

**ROTATING MACHINERY SERVICES**

**WIND ENERGY SERVICES**

**CONTROL SYSTEM INTEGRATION**

**TRAINING SERVICES**

Shermco®


TRAININGSERVICES@SHERMCO.COM
SHERMCO.COM/TRAINING
888.SHERMCO


# 2021 TRAINING SCHEDULE AT A GLANCE

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|---|---|---|---|---|---|---|
| COURSE | | VENUE | DATES | COST | VENUE | DATES |
| | | | | | | |
| Electrical Safety for Qualified Workers | | OE – DALLAS TX | JAN 5-7-2021 | $860 | OE – DALLAS TX | FEB 9-11-2021 |
| Lab Session - Electrical Safety for Qualified Workers | | OE – DALLAS TX | JAN 8-2021 | $580 | OE – DALLAS TX | FEB 12-2021 |
| Electrical Safety for Qualified Workers | | OE – AUSTIN TX | JAN 12-14-2021 | $860 | OE – HOUSTON | FEB 16-18-2021 |
| Lab Session - Electrical Safety for Qualified Workers | | OE – AUSTIN TX | JAN 15-2021 | $580 | OE - HOUSTON | FEB 19-2021 |
| Electrical Safety for Qualified Workers (Virtual) | | ONLINE-VIRTUAL | JAN 19-20-2021 | $830 | ONLINE-VIRTUAL | FEB 16-17-2021 |
| Electrical Safety Refresher | | ONLINE-VIRTUAL | JAN 21-2021 | $550 | ONLINE-VIRTUAL | FEB 18-2021 |
| Electrical Safety for Managers | | N/A | N/A | $550 | ONLINE-VIRTUAL | FEB 12-2021 |
| Electrical Safety for Non-Electrical Personnel | | ONLINE-VIRTUAL | JAN 13-2021 | $550 | ONLINE-VIRTUAL | FEB 16-2021 |
| Electrical Safety for Operators | | ONLINE-VIRTUAL | JAN 14-2021 | $550 | ONLINE-VIRTUAL | FEB 17-2021 |
| Electrical Safety for Utilities | | ONLINE-VIRTUAL | JAN 15-2021 | $830 | N/A | N/A |
| Understanding NFPA 70E (2020 edition) | | ONLINE-VIRTUAL | JAN 15-2021 | $550 | N/A | N/A |
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| COURSE | | VENUE | DATES | COST | VENUE | DATES |
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| Electrical Safety for Qualified Workers | | OE – DALLAS TX | MAR 02-04-2021 | $860 | OE – DALLAS TX | APR 06-08-2021 |
| Lab Session - Electrical Safety for Qualified Workers | | OE – DALLAS TX | MAR 05-2021 | $580 | OE – DALLAS TX | APR 09-2021 |
| Electrical Safety for Qualified Workers | | OE – TULSA OK | MAR 09-11-2021 | $860 | OE - HOUSTON | APR 13-15-2021 |
| Lab Session - Electrical Safety for Qualified Workers | | OE – TULSA OK | MAR 12-2021 | $580 | OE - HOUSTON | APR 16-2021 |
| Electrical Safety for Qualified Workers (Virtual) | | ONLINE-VIRTUAL | MAR 16-17-2021 | $830 | ONLINE-VIRTUAL | APR 20-21-2021 |
| Electrical Safety Refresher | | ONLINE-VIRTUAL | MAR 18-2021 | $550 | ONLINE-VIRTUAL | APR 22-2021 |
| Electrical Safety for Managers | | ONLINE-VIRTUAL | MAR 16-2021 | $550 | N/A | N/A |
| Electrical Safety for Non-Electrical Personnel | | ONLINE-VIRTUAL | MAR 17-2021 | $550 | ONLINE-VIRTUAL | APR 27-2021 |
| Electrical Safety for Operators | | ONLINE-VIRTUAL | MAR 18-2021 | $550 | ONLINE-VIRTUAL | APR 28-2021 |
| Electrical Safety for Utilities | | N/A | N/A | $830 | ONLINE-VIRTUAL | APR 29-2021 |
| Understanding NFPA 70E (2020 edition) | | | | | ONLINE-VIRTUAL | APR 30-2021 |
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| COURSE | | VENUE | DATES | COST | VENUE | DATES |
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| Electrical Safety for Qualified Workers | | OE – DALLAS TX | MAY 04-06-2021 | $860 | OE – DALLAS TX | JUN 01-03-2021 |
| Lab Session - Electrical Safety for Qualified Workers | | OE – DALLAS TX | MAY 07-2021 | $580 | OE – DALLAS TX | JUN 04-2021 |
| Electrical Safety for Qualified Workers | | OE – AUSTIN TX | MAY 11-13-2021 | $860 | OE - HOUSTON | JUN 08-10-2021 |
| Lab Session - Electrical Safety for Qualified Workers | | OE – AUSTIN TX | MAY 14-2021 | $580 | OE - HOUSTON | JUN 11-2021 |
| Electrical Safety for Qualified Workers (Virtual) | | ONLINE-VIRTUAL | MAY 11-12-2021 | $830 | ONLINE-VIRTUAL | JUN 15-16-2021 |
| Electrical Safety Refresher | | ONLINE-VIRTUAL | MAY 13-2021 | $550 | ONLINE-VIRTUAL | JUN 17-2021 |
| Electrical Safety for Managers | | N/A | N/A | $550 | ONLINE-VIRTUAL | JUN 18-2021 |
| Electrical Safety for Non-Electrical Personnel | | ONLINE-VIRTUAL | MAY 18-2021 | $550 | ONLINE-VIRTUAL | JUN 22-2021 |
| Electrical Safety for Operators | | ONLINE-VIRTUAL | MAY 19-2021 | $550 | ONLINE-VIRTUAL | JUN 23-2021 |
| Electrical Safety for Utilities | | ONLINE-VIRTUAL | MAY 20-21-2021 | $830 | N/A | N/A |
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| COURSE | | VENUE | DATES | COST | VENUE | DATES |
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| Electrical Safety for Qualified Workers | | OE – DALLAS TX | JUL 06-08-2021 | $860 | OE – DALLAS TX | AUG 03-05-2021 |
| Lab Session - Electrical Safety for Qualified Workers | | OE – DALLAS TX | JUL 09-2021 | $580 | OE – DALLAS TX | AUG 06-2021 |
| Electrical Safety for Qualified Workers | | OE – TULSA OK | JUL 13-15-2021 | $860 | OE - HOUSTON | AUG 10-12-2021 |
| Lab Session - Electrical Safety for Qualified Workers | | OE – TULSA OK | JUL 16-2021 | $580 | OE - HOUSTON | AUG 13-2021 |
| Electrical Safety for Qualified Workers (Virtual) | | ONLINE-VIRTUAL | JUL 20-2021 | $830 | ONLINE-VIRTUAL | AUG 17-2021 |
| Electrical Safety Refresher | | ONLINE-VIRTUAL | JUL 21-2021 | $550 | ONLINE-VIRTUAL | AUG 18-2021 |
| Electrical Safety for Managers | | ONLINE-VIRTUAL | JUL 22-2021 | $550 | N/A | N/A |
| Electrical Safety for Non-Electrical Personnel | | ONLINE-VIRTUAL | JUL 27-2021 | $550 | ONLINE-VIRTUAL | AUG 24-2021 |
| Electrical Safety for Operators | | ONLINE-VIRTUAL | JUL 28-2021 | $550 | ONLINE-VIRTUAL | AUG 25-2021 |
| Electrical Safety for Utilities | | N/A | N/A | $830 | ONLINE-VIRTUAL | AUG 26-27-2021 |
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| COURSE | | VENUE | DATES | COST | VENUE | DATES |
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| Electrical Safety for Qualified Workers | | OE – DALLAS TX | SEPT 07-09-2021 | $860 | OE – DALLAS TX | OCT 05-07-2021 |
| Lab Session - Electrical Safety for Qualified Workers | | OE – DALLAS TX | SEPT 10-2021 | $580 | OE – DALLAS TX | OCT 08-2021 |
| Electrical Safety for Qualified Workers | | OE – AUSTIN TX | SEPT 14-16-2021 | $860 | OE - HOUSTON | OCT 12-14-2021 |
| Lab Session - Electrical Safety for Qualified Workers | | OE – AUSTIN TX | SEPT 17-2021 | $580 | OE - HOUSTON | OCT 15-2021 |
| Electrical Safety for Qualified Workers (Virtual) | | ONLINE-VIRTUAL | SEPT 21-22-2021 | $830 | ONLINE-VIRTUAL | OCT 19-20-2021 |
| Electrical Safety Refresher | | ONLINE-VIRTUAL | SEPT 23-2021 | $550 | ONLINE-VIRTUAL | OCT 21-2021 |
| Electrical Safety for Managers | | ONLINE-VIRTUAL | SEPT 24-2021 | $550 | N/A | N/A |
| Electrical Safety for Non-Electrical Personnel | | ONLINE-VIRTUAL | SEPT 28-2021 | $550 | ONLINE-VIRTUAL | OCT 26-2021 |
| Electrical Safety for Operators | | ONLINE-VIRTUAL | SEPT 29-2021 | $550 | ONLINE-VIRTUAL | OCT 27-2021 |
| Electrical Safety for Utilities | | ONLINE-VIRTUAL | SEPT 29-30-2021 | $830 | N/A | N/A |
| Understanding NFPA 70E (2020 edition) | | ONLINE-VIRTUAL | SEPT 30-2021 | $550 | N/A | N/A |
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| COURSE | | VENUE | DATES | COST | VENUE | DATES |
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| Electrical Safety for Qualified Workers | | OE – DALLAS TX | NOV 02-04-2021 | $860 | OE – DALLAS TX | DEC 07-09-2021 |
| Lab Session - Electrical Safety for Qualified Workers | | OE – DALLAS TX | NOV 05-2021 | $580 | OE – DALLAS TX | DEC 10-2021 |
| Electrical Safety for Qualified Workers | | OE – TULSA OK | NOV 09-11-2021 | $860 | OE - HOUSTON | DEC 07-09-2021 |
| Lab Session - Electrical Safety for Qualified Workers | | OE – TULSA OK | NOV 12-2021 | $580 | OE - HOUSTON | DEC 10-2021 |
| Electrical Safety for Qualified Workers (Virtual) | | ONLINE-VIRTUAL | NOV 16-17-2021 | $830 | ONLINE-VIRTUAL | DEC 14-15-2021 |
| Electrical Safety Refresher | | ONLINE-VIRTUAL | NOV 09-2021 | $550 | ONLINE-VIRTUAL | DEC 14-2021 |
| Electrical Safety for Managers | | N/A | N/A | $550 | ONLINE-VIRTUAL | DEC 15-2021 |
| Electrical Safety for Non-Electrical Personnel | | ONLINE-VIRTUAL | NOV 11-2021 | $550 | ONLINE-VIRTUAL | DEC 16-2021 |
| Electrical Safety for Operators | | ONLINE-VIRTUAL | NOV 12-2021 | $550 | ONLINE-VIRTUAL | DEC 17-2021 |
| Electrical Safety for Utilities | | N/A | N/A | $830 | ONLINE-VIRTUAL | DEC 01-02-2021 |
| Understanding NFPA 70E (2020 edition) | | N/A | N/A | $550 | ONLINE-VIRTUAL | DEC 02-2021 |
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| COURSE | | VENUE | DATES | COST | VENUE | DATES |
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| Industrial Plant Electrical Maintenance | | N/A | N/A | $1420 | OE – HOUSTON | FEB 02-05-2021 |
| Low-to-Medium Voltage Circuit Breaker Maint. | | OE – DALLAS | JAN 12-15-2021 | $1420 | OE - HOUSTON | FEB 09-12-2021 |
| Substation Maintenance I | | OE – DALLAS | JAN 19-22-2021 | $1760 | OE - HOUSTON | FEB 16-19-2021 |
| Substation Maintenance II | | OE – DALLAS | JAN 26-29-2021 | $1760 | OE - HOUSTON | FEB 23-26-2021 |
| Spicing and termination of Medium-Voltage Cables | | OE – DALLAS | JAN 19-22-2021 | $2150 | N/A | N/A |
| Switchgear Ops, Safety and Trouble for Operators | | N/A | N/A | $860 | OE - HOUSTON | FEB 23-24-2021 |
| | | | | | | |
| COURSE | | VENUE | DATES | COST | VENUE | DATES |
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| Basic Electrical Fundamentals | | OE - DALLAS | JAN 11-12-2021 | $1025 | OE - HOUSTON | FEB 01-02-2021 |
| Basic Electrical Technical Skills | | OE - DALLAS | JAN 13-15-2021 | $1025 | OE - HOUSTON | FEB 03-05-2021 |
| Motor Maintenance and Testing | | N/A | N/A | $1320 | OE - HOUSTON | FEB 16-18-2021 |
| Troubleshooting and Electrical Print Reading | | OE - DALLAS | JAN 19-20-2021 | $850 | OE - HOUSTON | FEB 16-17-2021 |
| National Electrical Code | | ONLINE-VIRTUAL | JAN 26-28-2021 | $1320 | N/A | N/A |
| Fundamentals of Protective Relay Testing & Maint. | | N/A | N/A | $1520 | N/A | N/A |
| Introduction to SEL Relays | | N/A | N/A | $820 | N/A | N/A |
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| COURSE | | VENUE | DATES | COST | VENUE | DATES |
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| Industrial Plant Electrical Maintenance | | OE - DALLAS | MAR 02-05-2021 | $1420 | N/A | N/A |
| Low-to-Medium Voltage Circuit Breaker Maint. | | OE - DALLAS | MAR 09-12-2021 | $1420 | OE - HOUSTON | APR 13-16-2021 |
| Substation Maintenance I | | OE - DALLAS | MAR 16-19-2021 | $1760 | OE - HOUSTON | APR 20-23-2021 |
| Substation Maintenance II | | OE - DALLAS | MAR 23-26-2021 | $1760 | OE - HOUSTON | APR 27-30-2021 |
| Spicing and termination of Medium-Voltage Cables | | N/A | N/A | $2150 | OE - HOUSTON | APR 20-23-2021 |
| Switchgear Ops, Safety and Trouble for Operators | | OE - DALLAS | MAR 30-31-2021 | $860 | N/A | N/A |
| | | | | | | |
| COURSE | | VENUE | DATES | COST | VENUE | DATES |
| | | | | | | |
| Basic Electrical Fundamentals | | OE - DALLAS | MAR 01-02-2021 | $1025 | OE - HOUSTON | APR 05-06-2021 |
| Basic Electrical Technical Skills | | OE - DALLAS | MAR 03-05-2021 | $1025 | OE - HOUSTON | APR 07-09-2021 |
| Motor Maintenance and Testing | | OE - DALLAS | MAR 09-11-2021 | $1320 | N/A | N/A |
| Troubleshooting and Electrical Print Reading | | OE - DALLAS | MAR 09-10-2021 | $850 | OE - HOUSTON | APR 13-14-2021 |
| National Electrical Code | | N/A | N/A | $1320 | ONLINE-VIRTUAL | APR 20-22-2021 |
| Fundamentals of Protective Relay Testing & Maint. | | N/A | N/A | $1520 | N/A | N/A |
| Introduction to SEL Relays | | N/A | N/A | $820 | N/A | N/A |
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| COURSE | | VENUE | DATES | COST | VENUE | DATES |
| | | | | | | |
| Industrial Plant Electrical Maintenance | | N/A | N/A | $1420 | OE - HOUSTON | JUN 01-04-2021 |
| Low-to-Medium Voltage Circuit Breaker Maint. | | OE - DALLAS | MAY 11-14-2021 | $1420 | OE - HOUSTON | JUN 08-11-2021 |
| Substation Maintenance I | | OE - DALLAS | MAY 18-21-2021 | $1760 | OE - HOUSTON | JUN 15-18-2021 |
| Substation Maintenance II | | OE - DALLAS | MAY 25-28-2021 | $1760 | OE - HOUSTON | JUN 22-25-2021 |
| Spicing and termination of Medium-Voltage Cables | | OE - DALLAS | MAY 18-21-2021 | $2150 | N/A | N/A |
| Switchgear Ops, Safety and Trouble for Operators | | N/A | N/A | $860 | OE - HOUSTON | JUN 22-23-2021 |
| | | | | | | |
| COURSE | | VENUE | DATES | COST | VENUE | DATES |
| | | | | | | |
| Basic Electrical Fundamentals | | OE - DALLAS | MAY 03-04-2021 | $1025 | OE - HOUSTON | JUN 07-08-2021 |
| Basic Electrical Technical Skills | | OE - DALLAS | MAY 05-07-2021 | $1025 | OE - HOUSTON | JUN 09-11-2021 |
| Motor Maintenance and Testing | | N/A | N/A | $1320 | OE - HOUSTON | JUN 01-03-2021 |
| Troubleshooting and Electrical Print Reading | | OE - DALLAS | MAY 25-26-2021 | $850 | OE - HOUSTON | JUN 15-16-2021 |
| National Electrical Code | | ONLINE-VIRTUAL | MAY 25-27-2021 | $1320 | N/A | N/A |
| Fundamentals of Protective Relay Testing & Maint. | | N/A | N/A | $1520 | OE - HOUSTON | N/A |
| Introduction to SEL Relays | | N/A | N/A | $820 | N/A | N/A |
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| COURSE | | VENUE | DATES | COST | VENUE | DATES |
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| Industrial Plant Electrical Maintenance | | OE - DALLAS | JUL 06-09-2021 | $1420 | N/A | N/A |
| Low-to-Medium Voltage Circuit Breaker Maint. | | OE - DALLAS | JUL 13-16-2021 | $1420 | OE - HOUSTON | AUG 10-13-2021 |
| Substation Maintenance I | | OE - DALLAS | JUL 20-23-2021 | $1760 | OE - HOUSTON | AUG 17-20-2021 |
| Substation Maintenance II | | OE - DALLAS | JUL 27-30-2021 | $1760 | OE - HOUSTON | AUG 24-27-2021 |
| Spicing and termination of Medium-Voltage Cables | | N/A | N/A | $2150 | OE - HOUSTON | AUG 17-20-2021 |
| Switchgear Ops, Safety and Trouble for Operators | | OE - DALLAS | JUL 27-28-2021 | $860 | N/A | V/A |
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| COURSE | | VENUE | DATES | COST | VENUE | DATES |
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| Basic Electrical Fundamentals | | OE - DALLAS | JUL 05-06-2021 | $1025 | OE - HOUSTON | AUG 02-03-2021 |
| Basic Electrical Technical Skills | | OE - DALLAS | JUL 07-09-2021 | $1025 | OE - HOUSTON | AUG 04-06-2021 |
| Motor Maintenance and Testing | | OE - DALLAS | JUL 06-08-2021 | $1320 | N/A | N/A |
| Troubleshooting and Electrical Print Reading | | OE - DALLAS | JUL 13-14-2021 | $850 | OE - HOUSTON | AUG 10-12-2021 |
| National Electrical Code | | N/A | N/A | $1320 | ONLINE-VIRTUAL | AUG 17-19-2021 |
| Fundamentals of Protective Relay Testing & Maint. | | OE - DALLAS | JUL 20-23-2021 | $1550 | OE - HOUSTON | AUG 17-20-2021 |
| Introduction to SEL Relays | | OE - DALLAS | JUL 27-28-2021 | $850 | OE - HOUSTON | AUG 24-25-2021 |
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| COURSE | | VENUE | DATES | COST | VENUE | DATES |
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| Industrial Plant Electrical Maintenance | | N/A | N/A | $1420 | OE - HOUSTON | OCT 05-08-2021 |
| Low-to-Medium Voltage Circuit Breaker Maint. | | OE - DALLAS | SEPT 07-10-2021 | $1420 | OE - HOUSTON | OCT 12-15-2021 |
| Substation Maintenance I | | OE - DALLAS | SEPT 14-17-2021 | $1760 | OE - HOUSTON | OCT 19-22-2021 |
| Substation Maintenance II | | OE - DALLAS | SEPT 21-24-2021 | $1760 | OE - HOUSTON | OCT 26-29-2021 |
| Spicing and termination of Medium-Voltage Cables | | OE - DALLAS | SEPT 14-17-2021 | $2150 | N/A | N/A |
| Switchgear Ops, Safety and Trouble for Operators | | N/A | N/A | $860 | OE - HOUSTON | OCT 26-27-2021 |
| | | | | | | |
| COURSE | | VENUE | DATES | COST | VENUE | DATES |
| | | | | | | |
| Basic Electrical Fundamentals | | OE - DALLAS | SEPT 06-07-2021 | $1025 | OE - HOUSTON | OCT 04-05-2021 |
| Basic Electrical Technical Skills | | OE - DALLAS | SEPT 08-10-2021 | $1025 | OE - HOUSTON | OCT 06-08-2021 |
| Motor Maintenance and Testing | | N/A | N/A | $1320 | OE - HOUSTON | OCT 12-14-2021 |
| Troubleshooting and Electrical Print Reading | | OE - DALLAS | SEPT 21-22-2021 | $850 | OE - HOUSTON | OCT 12-13-2021 |
| National Electrical Code | | ONLINE-VIRTUAL | SEPT 28-30-2021 | $1320 | N/A | N/A |
| Fundamentals of Protective Relay Testing & Maint. | | OE - DALLAS | SEPT 21-24-2021 | $1520 | OE - HOUSTON | OCT 19-22-2021 |
| Introduction to SEL Relays | | OE - DALLAS | SEPT 28-29-2021 | $820 | OE - HOUSTON | OCT 26-27-2021 |
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| COURSE | | VENUE | DATES | COST | VENUE | DATES |
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| Industrial Plant Electrical Maintenance | | OE - DALLAS | NOV 02-05-2021 | $1420 | N/A | N/A |
| Low-to-Medium Voltage Circuit Breaker Maint. | | OE - DALLAS | NOV 02-05-2021 | $1420 | OE - HOUSTON | DEC 07-10-2021 |
| Substation Maintenance I | | OE - DALLAS | NOV 09-12-2021 | $1760 | OE - HOUSTON | DEC 07-10-2021 |
| Substation Maintenance II | | OE - DALLAS | NOV 16-19-2021 | $1760 | OE - HOUSTON | DEC 14-17-2021 |
| Spicing and termination of Medium-Voltage Cables | | N/A | N/A | $2150 | OE - HOUSTON | DEC 14-17-2021 |
| Switchgear Ops, Safety and Trouble for Operators | | OE - DALLAS | NOV 16-17-2021 | $860 | N/A | N/A |
| | | | | | | |
| COURSE | | VENUE | DATES | COST | VENUE | DATES |
| | | | | | | |
| Basic Electrical Fundamentals | | OE - DALLAS | NOV 02-03-2021 | $1025 | OE - HOUSTON | DEC 06-07-2021 |
| Basic Electrical Technical Skills | | OE - DALLAS | NOV 04-06-2021 | $1025 | OE - HOUSTON | DEC 08-09-2021 |
| Motor Maintenance and Testing | | OE - DALLAS | NOV 09-11-2021 | $1320 | N/A | N/A |
| Troubleshooting and Electrical Print Reading | | OE - DALLAS | NOV 09-10-2021 | $850 | OE - HOUSTON | DEC 14-15-2021 |
| National Electrical Code | | N/A | N/A | $1320 | ONLINE-VIRTUAL | DEC 14-16-2021 |
| Fundamentals of Protective Relay Testing & Maint. | | N/A | N/A | $1520 | N/A | N/A |
| Introduction to SEL Relays | | N/A | N/A | $820 | N/A | N/A |
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