Industrial Electricity and Electronics Series - 1.6 CEUs*
The Industrial Electricity and Electronics series of courses explains the fundamental principles of electronic systems used in industrial settings.

**Basic Electricity Principles - 0.3 CEUs**
**Basic Electricity**
- Simplified Atomic Theory
- EMF
- Current Flow
- Sources of Voltage

**Conductors and Insulators**
- Conductivity
- Conductors
- Insulation

**Resistors**
- Resistor Applications
- Resistor Construction
- Resistor Markings
- How Resistors are Rated

**Basic Laws of Electrical Circuits**
- Basic Laws of Electrical Circuits
- Using Ohm’s Law
- Using Kirchhoff’s Current Law

**Electrical Power**
- Electrical Power
- Unit Conversion

**Electromagnetism**
- Permanent Magnets
- Electromagnets

**DC Circuits - 0.2 CEUs**
**Batteries**
- Theory of Operation
- Battery Construction
- Battery Capacity and Ratings

**Series Circuits**
- Series Circuit Fundamentals
- Calculating Resistance in a Series Circuit
- Calculating Current in a Series Circuit
- Calculating Voltage Drops in a Series Circuit

**Parallel Circuits**
- Parallel Circuit Fundamentals
- Calculating Resistance in a Parallel Circuit
- Calculating Voltage in a Parallel Circuit
- Calculating Current in a Parallel Circuit

**Series-Parallel Circuits**
- Series-Parallel Circuit Fundamentals
- Calculating Resistance in a Series-Parallel Circuit
- Calculating Current in a Series-Parallel Circuit
- Calculating Voltage Drops in a Series-Parallel Circuit

**Switches and Relays**
- Pushbutton and Rotary Switches
- Disconnect and Bus Transfer Switches
- Electromagnetic Relays

*CEUs are calculated and awarded at the subject area level. Series level totals are to show the available amount of CEUs that can be earned for completing all subject areas in a particular series.
AC Circuits - 0.1 CEUs
AC Generation and Basic AC Concepts
• AC Generation Components and Operation
• Development of a Sine Wave Output and AC Generation Analysis
• Three-Phase Circuits
• AC Voltage, Current, and Power

Inductance, Capacitance, and Impedance
• Inductors and Inductance
• Capacitors and Capacitance
• Calculating Circuit Capacitance, Inductance, and Impedance
• Resonant Circuits

Transformers
• Transformer Fundamentals
• Transformer Construction and Connections
• Types of Transformers

Motors and Servos - 0.2 CEUs
AC and DC Motors
• Terminology and Definitions
• DC Motors
• AC Motors
• Motor Protection
• Motor Fundamentals

Motor Control Fundamentals
• Types of Controllers
• Control Devices and Electrical Systems
• Magnetic Contactors
• Control Circuits

Servo Drive Fundamentals
• Overview
• Operation
• Servo Motors

Semiconductors - 0.2 CEUs
Diodes
• Diode Basics
• Diode Symbols
• Diode Characteristics

Bipolar Transistors
• Transistor Fundamentals
• Transistor Biasing
• Transistor Configuration

Other Semiconductors
• SCRs
• DIACs and TRIACs
• UJTs and FETs

Power Supplies - 0.2 CEUs
Power Supplies
• Rectifier Circuits
• Power Supply Filters
• Voltage Regulators

Uninterruptible Power Supplies
• Rectifier Circuits
• Power Supply Filters
• Voltage Regulators

Fuses
• Fuses
• Fuse Ratings
• Fuse Holders
• Checking and Replacing Fuses

Circuit Breakers
• Overview
• Circuit Breaker Components
• Circuit Breaker Characteristics
Digital Electronics - 0.2 CEUs
Communication and Controls I
- Communications Overview
- Telemetry Concepts
- Protocol

Communication and Controls II
- Communication Networks
- Industrial Protocols
- Working with Communication Cables

Introduction to PLCs
- PLC Components
- Basic Operation
- Scan Cycle
- Ladder Logic

Introduction to VFDs
- Overview and Operational Theory
- VFD Function and Operation
- Human Interface Module

Logic Gates and Number Systems
- Logic Gates
- Number Systems

Work Practices - 0.2 CEUs
Print Reading
- Mechanical Drawings
- Electrical Drawings

Grounding Practices
- Grounding Basics
- System Grounding
- Equipment Grounding
- Common Grounding Faults

Test Equipment
- Multimeters
- Common Electrical Testers
- Thermal Imaging

Electrical Safe Work Practices
- Hazards
- Qualifications
- Boundaries
- Personal Protective Equipment

Troubleshooting
- Troubleshooting Fundamentals
- Divide and Conquer
- Seven-Step Process