



## 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

## 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