



## ELECTRICAL CURRICULA OUTLINE

### CORE CURRICULUM 2015

#### **Basic Safety (Construction Site Safety Orientation) (12.5 Hours)**

**(Module ID 00101-15)** Presents basic jobsite safety information to prepare workers for the construction environment. Describes the common causes of workplace incidents and accidents and how to avoid them. Introduces common personal protective equipment, including equipment required for work at height, and its proper use. Information related to safety in several specific environments, including welding areas and confined spaces, is also provided.

#### **Introduction to Construction Math (10 Hours)**

**(Module ID 00102-15)** Reviews basic math skills related to the construction trades and demonstrates how they apply to the trades. Covers multiple systems of measurement, decimals, fractions, and basic geometry.

#### **Introduction to Hand Tools (10 Hours)**

**(Module ID 00103-15)** Introduces common hand tools used in a variety of construction crafts. Identifies tools and how to safely use them. Also presents proper hand tool maintenance.

#### **Introduction to Power Tools (10 Hours)**

**(Module ID 00104-15)** Identifies and describes the operation of many power tools common in the construction environment. Provides instruction on proper use, as well as safe-handling guidelines and basic maintenance.

#### **Introduction to Construction Drawings (10 Hours)**

**(Module ID 00105-15)** Introduces the basic terms, components, and symbols of construction drawings, as well as the most common drawing types. Also covers the interpretation and use of drawing dimensions.

#### **Introduction to Basic Rigging (7.5 Elective Hours)**

**(Module ID 00106-15)** Provides basic information related to rigging and rigging hardware, such as slings, rigging hitches, and hoists. Emphasizes safe working habits in the vicinity of rigging operations.

#### **Basic Communication Skills (7.5 Hours)**

**(Module ID 00107-15)** Provides techniques for effective communication on the job. Includes examples that emphasize the importance of both written and verbal communication skills. Describes the importance of reading skills in the construction industry and discusses effective telephone and email communication skills.

#### **Basic Employability Skills (7.5 Hours)**

**(Module ID 00108-15)** Describes the opportunities offered by the construction trades. Discusses critical thinking and essential problem-solving skills. Also identifies and discusses positive social skills and presents information on computer systems and their industry applications.

#### **Introduction to Material Handling (5 Hours)**

**(Module ID 00109-15)** Describes the hazards associated with handling materials and provides techniques to avoid both injury and property damage. Also introduces common material handling equipment.

## **ELECTRICAL LEVEL ONE CONTENTS**

### **Orientation to the Electrical Trade (2.5 Hours)**

(Module ID 26101-14) Provides an overview of the electrical trade and discusses the career paths available to electricians.

### **Electrical Safety (10 Hours)**

(Module ID 26102-14) Covers safety rules and regulations for electricians, including precautions for electrical hazards found on the job. Also covers the OSHA-mandated lockout/Tagout procedure.

### **Introduction to Electrical Circuits (7.5 Hours)**

(Module ID 26103-14) Introduces electrical concepts used in Ohm's law applied to DC series circuits. Covers atomic theory, electromotive force, resistance, and electric power equations.

### **Electrical Theory (7.5 Hours)**

(Module ID 26104-14) Introduces series, parallel, and seriesparallel circuits. Covers resistive circuits, Kirchhoff's voltage and current laws, and circuit analysis.

### **Introduction to the *National Electrical Code*® (7.5 Hours)**

(Module ID 26105-14) Provides a road map for using the *NEC*®. Introduces the layout and the types of information found within the code book. Allows trainees to practice finding information using an easy-to-follow procedure.

### **Device Boxes (10 Hours)**

(Module ID 26106-14) Covers the hardware and systems used by an electrician to mount and support boxes, receptacles, and other electrical components. Also covers *NEC*® fill and pull requirements for device, pull, and junction boxes under 100 cubic inches.

### **Hand Bending (10 Hours)**

(Module ID 26107-14) Introduces conduit bending and installation. Covers the techniques for using hand-operated and step conduit benders, as well as cutting, reaming, and threading conduit.

### **Raceways and Fittings (20 Hours)**

(Module ID 26108-14) Introduces the types and applications of raceways, wireways, and ducts. Stresses the applicable *NEC*® requirements.

### **Conductors and Cables (10 Hours)**

(Module ID 26109-14) Focuses on the types and applications of conductors and covers proper wiring techniques. Stresses the applicable *NEC*® requirements.

### **Basic Electrical Construction Drawings (7.5 Hours)**

(Module ID 26110-14) Describes electrical prints, drawings, and symbols, and the types of information that can be found on schematics, one-lines, and wiring diagrams.

### **Residential Electrical Services (15 Hours)**

(Module ID 26111-14) Covers the electrical devices and wiring techniques common to residential construction and maintenance. Allows trainees to practice making service calculations. Stresses the applicable *NEC*® requirements.

### **Electrical Test Equipment (5 Hours)**

(Module ID 26112-14) Covers proper selection, inspection, and use of common electrical test equipment, including voltage testers, clamp-on ammeters, ohmmeters, multimeters, phase/motor rotation testers, and data recording equipment. Also covers safety precautions and meter category ratings.

## **ELECTRICAL LEVEL TWO CONTENTS**

### **Alternating Current** (17.5 Hours)

(Module ID 26201-14) Describes forces that are characteristic of alternating-current systems and the application of Ohm's law to AC circuits.

### **Motors: Theory and Application** (20 Hours)

(Module ID 26202-14) Covers AC and DC motors, including the main components, circuits, and connections.

### **Electric Lighting** (15 Hours)

(Module ID 26203-14) Introduces principles of human vision and the characteristics of light. Focuses on the handling and installation of various types of lamps and lighting fixtures.

### **Conduit Bending** (15 Hours)

(Module ID 26204-14) Covers bends in conduit up to 6 inches. Focuses on mechanical, hydraulic, and electrical benders.

### **Pull and Junction Boxes** (12.5 Hours)

(Module ID 26205-14) Explains how to select and size pull boxes, junction boxes, and handholes.

### **Conductor Installations** (10 Hours)

(Module ID 26206-14) Covers the transportation, storage, and setup of cable reels; methods of rigging; and procedures for complete cable pulls in raceways and cable trays.

### **Cable Tray** (7.5 Hours)

(Module ID 26207-14) Focuses on *NEC*® installation requirements for cable tray, including cable installations.

### **Conductor Terminations and Splices** (7.5 Hours)

(Module ID 26208-14) Describes methods of terminating and splicing conductors, including preparing and taping conductors.

### **Grounding and Bonding** (15 Hours)

(Module ID 26209-14) Focuses on the purpose of grounding and bonding electrical systems. Thoroughly covers *NEC*® requirements.

### **Circuit Breakers and Fuses** (12.5 Hours)

(Module ID 26210-14) Describes fuses and circuit breakers along with their practical applications. Also covers sizing.

### **Control Systems and Fundamental Concepts** (12.5 Hours)

(Module ID 26211-14) Gives basic descriptions of various types of contactors and relays along with their practical applications.

## **ELECTRICAL LEVEL THREE CONTENTS**

### **Load Calculations — Branch and Feeder Circuits** (17.5 Hours)

(Module ID 26301-14) Explains how to calculate branch circuit and feeder loads for residential and commercial applications.

### **Conductor Selection and Calculations** (15 Hours)

(Module ID 26302-14) Covers the factors involved in conductor selection, including insulation types, current-carrying capacity, temperature ratings, and voltage drop.

### **Practical Applications of Lighting** (12.5 Hours)

(Module ID 26303-14) Describes specific types of incandescent, fluorescent, and HID lamps, as well as ballasts. Also covers troubleshooting and various types of lighting controls.

### **Hazardous Locations** (15 Hours)

(Module ID 26304-14) Presents the *NEC*® requirements for equipment installed in hazardous locations.

**Overcurrent Protection (25 Hours)**

(Module ID 26305-14) Explains how to size and select circuit breakers and fuses for various applications. Also covers short circuit calculations and troubleshooting.

**Distribution Equipment (12.5 Hours)**

(Module ID 26306-14) Discusses switchboards and switchgear, including installation, grounding, and maintenance requirements. Includes a set of drawings.

**Transformers (12.5 Hours)**

(Module ID 26307-14) Discusses transformer types, construction, connections, protection, and grounding.

**Commercial Electrical Services (10 Hours)**

(Module ID 26308-14) Covers the components, installation considerations, and *NEC*® requirements for commercial services.

**Motor Calculations (12.5 Hours)**

(Module ID 26309-14) Covers calculations required to size conductors and overcurrent protection for motor applications.

**Voice, Data, and Video (10 Hours)**

(Module ID 26310-14) Covers installation, termination, and testing of voice, data, and video cabling systems.

**Motor Controls (12.5 Hours)**

(Module ID 26311-14) Provides information on selecting, sizing, and installing motor controllers. Also covers control circuit pilot devices and basic relay logic.

## **ELECTRICAL LEVEL FOUR CONTENTS**

**Load Calculations — Feeders and Services (20 Hours)**

(Module ID 26401-14) Topics include basic calculation procedures for commercial and residential applications.

**Health Care Facilities (10 Hours)**

(Module ID 26402-14) Covers the installation of electric circuits in health care facilities, including the requirements for life safety and critical circuits.

**Standby and Emergency Systems (10 Hours)**

(Module ID 26403-14) Explains the *NEC*® requirements for electric generators and storage batteries.

**Basic Electronic Theory (10 Hours)**

(Module ID 26404-14) Explains the function and operation of basic electronic devices, including semiconductors, diodes, rectifiers, and transistors.

**Fire Alarm Systems (15 Hours)**

(Module ID 26405-14) Covers fire alarm control units, Digital Alarm Communicator Systems (DACS), wiring for alarm initiating and notification devices, and alarm system maintenance.

**Specialty Transformers (10 Hours)**

(Module ID 26406-14) Covers various types of transformers and their applications. Also provides information on selecting, sizing, and installing these devices.

**Advanced Controls (20 Hours)**

(Module ID 26407-14) Discusses applications and operating principles of solid-state controls, reduced-voltage starters, and adjustable frequency drives. Also covers basic troubleshooting procedures.

**HVAC Controls (15 Hours)**

(Module ID 26408-14) Provides a basic overview of HVAC systems and their controls. Also covers electrical troubleshooting and *NEC*® requirements.

**Heat Tracing and Freeze Protection (10 Hours)**

(Module ID 26409-14) Covers heat tracing systems along with their applications and installation requirements.

**Motor Operation and Maintenance** (10 Hours)

(Module ID 26410-14) Covers motor cleaning, testing, and preventive maintenance. Also describes basic troubleshooting procedures.

**Medium-Voltage Terminations/Splices** (10 Hours)

(Module ID 26411-14) Offers an overview of the NEC® and cable manufacturers' requirements for medium-voltage terminations and splices.

**Special Locations** (20 Hours)

(Module ID 26412-14) Describes NEC® requirements for selecting and installing equipment, enclosures, and devices in special locations including places of assembly, theaters, carnivals, agricultural buildings, marinas, temporary installations, wired partitions, and swimming pools.

**Fundamentals of Crew Leadership** (20 Hours)

(Module ID 46101-11) While this module has been designed to assist the recently promoted crew leader, it is beneficial for anyone in management. The course covers basic leadership skills and explains different leadership styles, communication, delegating, and problem solving. Jobsite safety and the crew leader's role in safety are discussed, as well as project planning, scheduling, and estimating. Includes performance tasks to assist the learning process.