MODULE OVERVIEW

This module describes the different sectors in the electrical trade, and the types of work and work environments electricians would find in the field. It covers the apprenticeship, training programs, and career opportunities. The responsibilities and characteristics a worker should possess are also described.

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum.*

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Describe the apprenticeship/training process for electricians.
2. Describe various career paths/opportunities one might follow in the electrical trade.
3. Define the various sectors of the electrical industry.
4. State the tasks typically performed by an electrician.
5. Explain the responsibilities and aptitudes of an electrician.

PERFORMANCE TASKS

This is a knowledge-based module. There are no Performance Tasks.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Exploring Careers in Construction
Help-wanted section from an electrical trade publication
Samples of NCCER Apprentice Training Recognition
Employee manual
OSHA Safety and Health Standards for the Construction Industry
Personal protective equipment
TV/VCR/DVD player
Copies of the Trade Terms Quiz *
Module Examination**

* Located in the back of this module.
** Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference work is suggested for both instructors and motivated trainees interested in further study. This is optional material for continued education rather than for task training.

National Electrical Code® Handbook, Latest Edition. Quincy, MA: National Fire Protection Association.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 2½ hours are suggested to cover *Orientation to the Electrical Trade*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

Topic **Planned Time**

Session I. The Electrical Trade

A. Introduction _____
B. Career Opportunities in the Electrical Field _____
C. Your Training Program _____
D. Responsibilities of the Employee _____
E. Responsibilities of the Employer _____
F. Safety _____
G. Review _____
H. Module Examination _____
   1. Trainees must score 70% or higher to receive recognition from NCCER.
   2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module introduces the trainees to the safety rules and regulations for electricians, including the necessary precautions for avoiding various job site hazards.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum; Electrical Level One,* Module 26101-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Recognize safe working practices in the construction environment.
2. Explain the purpose of OSHA and how it promotes safety on the job.
3. Identify electrical hazards and how to avoid or minimize them in the workplace.
4. Explain electrical safety issues concerning lockout/tagout procedures, confined space entry, respiratory protection, and fall protection systems.
5. Develop a task plan and a hazard assessment for a given task and select the appropriate PPE and work methods to safely perform the task.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Perform a visual inspection on various types of ladders.
2. Set up a ladder properly to perform a task.
3. Properly don a harness.
4. Perform a hazard assessment of a job such as replacing the lights in your classroom.
   - Discuss the work to be performed and the hazards involved.
   - Locate the phone closest to the work site and ensure that the local emergency telephone numbers are either posted at the phone or known by you and your partner(s).
   - Plan an escape route from the location in the event of an accident.

MATERIALS

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Copy of the latest edition of the *National Electrical Code®*
OSHA Electrical Safety Guidelines (pocket guide)
NFPA 70E
Various types of personal protective and safety equipment, including:
  Rubber gloves
  Insulating blankets
  Hot sticks
  Fuse pullers
  Shorting probes
  Safety glasses
  Face shields
Company safety manual
GFCI device
Company lockout/tagout procedures
Step ladders
Straight ladders
Solvent MSDS
Fall arrest system
Safety harnesses
Lockout/tagout devices and labels
Access to eye wash station
TV/DVD/VCR player (optional)
Safety videos (optional)
Module Examinations*
Performance Profile Sheet*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to work with ladders. Make sure that all trainees are briefed on appropriate safety procedures. Emphasize electrical safety.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

29 CFR Parts 1900-1910, Standards for General Industry. Occupational Safety and Health Administration, U.S. Department of Labor.

29 CFR Part 1926, Standards for the Construction Industry. Occupational Safety and Health Administration, U.S. Department of Labor.

National Electrical Code® Handbook, Latest Edition. Quincy, MA: National Fire Protection Association.

Standards for Electrical Safety in the Workplace, Latest Edition. Quincy, MA: National Fire Protection Association.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 10 hours are suggested to cover *Electrical Safety.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction to Electrical Hazards	
A. Introduction	_____
B. Electrical Shock	_____
C. Protective Equipment	_____
D. OSHA	_____
E. *NFPA 70E*	_____
Session II. Ladders, Lifts, and Lifting	
A. Ladders and Scaffolds	_____
B. Laboratory	_____
Trainees practice visually inspecting ladders. This laboratory corresponds to Performance Task 1.	
C. Laboratory	_____
Trainees practice setting up a ladder. This laboratory corresponds to Performance Task 2.	
D. Lifts, Hoists, and Cranes	_____
E. Lifting	_____
F. Basic Tool Safety	_____
Session III. General Construction Safety Topics	
A. Confined Space Entry Procedures	_____
B. First Aid	_____
C. Solvents and Toxic Vapors	_____
D. Asbestos, Batteries, PCBs, and Vapor Lamps	_____

Session IV. Fall Protection, Hazard Assessment, Review, and Testing

A. Fall Protection _____

B. Laboratory _____

Trainees practice donning a safety harness. This laboratory corresponds to Performance Task 3.

C. Hazard Assessment _____

D. Laboratory _____

Trainees practice performing a hazard assessment. This laboratory corresponds to Performance Task 4.

E. Module Review _____

F. Module Examination _____

1. Trainees must score 70% or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

G. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module introduces the trainee to electrical circuits. It offers a general introduction to electrical concepts used in Ohm's law. It includes atomic theory, electromagnetic force, resistance, and electric power equations. It also covers series, parallel, and series-parallel circuits.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum; Electrical Level One,* Modules 26101-08 and 26102-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Define voltage and identify the ways in which it can be produced.
2. Explain the difference between conductors and insulators.
3. Define the units of measurement that are used to measure the properties of electricity.
4. Identify the meters used to measure voltage, current, and resistance.
5. Explain the basic characteristics of series and parallel circuits.

PERFORMANCE TASKS

This is a knowledge-based module. There are no performance tasks.

MATERIALS

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Basic electrical circuit, including:
- Battery/power source
- Wiring
- Loads
- Switches

Copy of the latest edition of the *National Electrical Code®*
Examples of conductors, insulators, and resistors
Magnets
Simple electromagnet
Metal sheet
Iron filings
Battery
Sample schematics
Color-coded resistors
Various types of meters, including:
- Multimeter
- Voltmeter
- Clamp-on ammeter
- Ohmmeter
- Continuity tester
- Voltage tester

Module Examination*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Trainees may work with electrical test equipment. Make sure that all trainees are briefed on appropriate safety procedures. Emphasize electrical safety.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Electronics Fundamentals: Circuits, Devices, and Applications, Thomas L. Floyd. New York: Prentice Hall.
Principles of Electric Circuits, Thomas L. Floyd. New York: Prentice Hall.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 7.5 hours are suggested to cover *Introduction to Electrical Circuits.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

Topic	**Planned Time**
Session I. Introduction to Electrical Theory	
A. Introduction	_____
B. Atomic Theory	_____
C. Electrical Power Generation and Distribution	_____
D. Electric Charge and Current	_____
Session II. Ohm's Law, Schematics, and Measurements	
A. Ohm's Law	_____
B. Schematic Representation of Circuit Elements	_____
C. Resistors	_____
D. Electrical Circuits	_____
E. Electrical Measuring Instruments	_____
Session III. Power Equations, Review, and Testing	
A. Electrical Power	_____
B. Module Review	_____
C. Module Examination	_____

1. Trainees must score 70% or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module introduces trainees to circuit calculations involving the application of Ohm's and Kirchoff's laws.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum; Electrical Level One,* Modules 26101-08 through 26103-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Explain the basic characteristics of combination circuits.
2. Calculate, using Kirchhoff's voltage law, the voltage drop in series, parallel, and series-parallel circuits.
3. Calculate, using Kirchhoff's current law, the total current in parallel and series-parallel circuits.
4. Using Ohm's law, find the unknown parameters in series, parallel, and series-parallel circuits.

PERFORMANCE TASKS

This is a knowledge-based module. There are no performance tasks.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Copy of the latest edition of the *National Electrical Code®*
Module examination*

*Located in the Test Booklet.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Trainees may work with electrical test equipment. Make sure that all trainees are briefed on appropriate safety procedures. Emphasize electrical safety.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Electronics Fundamentals: Circuits, Devices, and Applications, Thomas L. Floyd. New York: Prentice Hall.
Principles of Electric Circuits, Thomas L. Floyd. New York: Prentice Hall.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 7.5 hours are suggested to cover *Electrical Theory.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

Topic	**Planned Time**
Session I. Resistive Circuits	
A. Introduction	_____
B. Resistive in Series	_____
C. Resistive in Parallel	_____
D. Series-Parallel Circuits	_____
Session II. Applying Ohm's Law to Resistive Circuits	
A. Voltage and Current in Series Circuits	_____
B. Voltage and Current in Parallel Circuits	_____
C. Voltage and Current in Series-Parallel Circuits	_____
Session III. Kirchhoff's Law, Review, and Testing	
A. Kirchhoff's Law	_____
B. Module Review	_____
C. Module Examination	_____

1. Trainees must score 70% or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

Introduction to the *National Electrical Code®* Annotated Instructor's Guide

Module 26105-08

MODULE OVERVIEW

This module introduces trainees to the requirements of the *National Electrical Code®*.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum; Electrical Level One,* Modules 26101-08 through 26104-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Explain the purpose and history of the *NEC®*.
2. Describe the layout of the *NEC®*.
3. Demonstrate how to navigate the *NEC®*.
4. Describe the purpose of the National Electrical Manufacturers Association and the NFPA.
5. Explain the role of nationally recognized testing laboratories.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Use ***NEC Article 90*** to determine the scope of the *NEC®*. State what is covered by the *NEC®* and what is not.
2. Find the definition of the term feeder in the *NEC®*.
3. Look up the *NEC®* specifications that you would need to follow if you were installing an outlet near a swimming pool.
4. Find the minimum wire bending space required for two No. 1/0 AWG conductors installed in a junction box or cabinet and entering opposite the terminal.

MATERIALS

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Copy of the latest edition of the *National Electrical Code®*
Module Examination*
Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference work is suggested for both instructors and motivated trainees interested in further study. This is optional material for continued education rather than for task training.

National Electrical Code® Handbook, Latest Edition. Quincy, MA: National Fire Protection Association.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 7.5 hours are suggested to cover *Introduction to the National Electrical Code®*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction to the *NEC®*	
A. Introduction	_____
B. Purpose and History of the *NEC®*	_____
C. The Layout of the *NEC®*	_____
Session II. Navigating the *NEC®* I	
A. Chapter 1 – General	_____
B. Chapter 2 – Wiring and Protection	_____
C. Chapter 3 – Wiring Methods and Materials	_____
D. Chapter 4 – Equipment for General Use	_____
E. Chapter 5 – Special Occupancies	_____
F. Chapters 6, 7, and 8 – Special Equipment, Special Conditions, and Communications Systems	_____
Session III. Navigating the *NEC®* II, Review, and Testing	
A. Examples of Navigating the *NEC®*	_____
B. Laboratory Trainees practice using the *NEC®*. This laboratory corresponds to Performance Tasks 1–4.	_____
C. Other Organizations	_____
D. Module Review	_____
E. Module Examination	_____
1. Trainees must score 70% or higher to receive recognition from NCCER.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	
F. Performance Testing	_____
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	

MODULE OVERVIEW

This module explains how to select and size outlet boxes, pull boxes, and junction boxes pursuant to *NEC*® requirements.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum; Electrical Level One,* Modules 26101-08 through 26105-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Describe the different types of nonmetallic and metallic boxes.
2. Calculate the *NEC*® fill requirements for boxes under 100 cubic inches.
3. Identify the appropriate box type and size for a given application.
4. Select and demonstrate the appropriate method for mounting a given box.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Identify the appropriate box type and size for a given application.
2. Select the minimum size pull or junction box for the following applications:
   - Conduit entering and exiting for a straight pull.
   - Conduit entering and exiting at an angle.

MATERIALS

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Conduit caps
Copy of the latest edition of the *National Electrical Code*®
Examples of different types of metallic and nonmetallic boxes, device covers, and extension rings
Examples of pull and junction boxes
Examples of device boxes
Wire nuts
Stripping tools
Wire
Module Examination*
Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Trainees may work with device boxes. Make sure that all trainees are briefed on appropriate safety procedures. Emphasize electrical safety.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

American Electrician's Handbook, Latest Edition. New York: Croft and Summers, McGraw-Hill.
National Electrical Code® Handbook, Latest Edition. Quincy, MA: National Fire Protection Association.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 10 hours are suggested to cover *Device Boxes.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction to Device Boxes	
A. Introduction	_____
B. Types of Boxes	_____
Session II. Sizing Outlet Boxes	
A. Sizing Outlet Boxes	_____
B. Laboratory Trainees practice identifying the appropriate type and size of box for a given application. This laboratory corresponds to Performance Task 1.	_____
C. Pull and Junction Boxes	_____
D. Laboratory Trainees practice selecting the minimum size pull or junction box. This laboratory corresponds to Performance Task 2.	_____
Session III. Installing Boxes	
A. *NEC®* Requirements	_____
B. Making Connections	_____
Session IV. Review and Testing	
A. Module Review	_____
B. Module Examination	_____
1. Trainees must score 70% or higher to receive recognition from NCCER.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	
C. Performance Testing	_____
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	

Hand Bending
Annotated Instructor's Guide

Module 26107-08

MODULE OVERVIEW

This module introduces trainees to the methods and procedures used in cutting, bending, and reaming conduit.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum; Electrical Level One,* Modules 26101-08 through 26106-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Identify the methods for hand bending and installing conduit.
2. Determine conduit bends.
3. Make 90° bends, back-to-back bends, offsets, kicks, and saddle bends using a hand bender.
4. Cut, ream, and thread conduit.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Make 90° bends, back-to-back bends, offsets, kicks, and saddle bends using a hand bender.
2. Cut, ream, and thread conduit.

MATERIALS

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Copy of the latest edition of the *National Electrical Code®*
OSHA Electrical Safety Guidelines (pocket edition)
Hand bender and manufacturer's instructions
Various pieces of conduit
Hickey bar
Manufacturers' gain tables
No. 10 or No. 12 solid wire
Tape measure
Calculator
Hacksaw
Pipe vise
Pipe cutter
Reamer
Cutting oil
Shop towels
Hand-operated threader
Sandbox or drip pan
Torpedo level
PVC pieces
PVC cements
Module Examination*
Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to cut and bend pipe. Make sure that all trainees are briefed on appropriate safety procedures. Emphasize hand tool safety.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Benfield Conduit Bending Manual, 2nd Edition. Overland Park, KS: EC&M Books.
National Electrical Code® Handbook, Latest Edition. Quincy, MA: National Fire Protection Association.
Tom Henry's Conduit Bending Package (includes video, book, and bending chart). Winter Park, FL: Code Electrical Classes, Inc.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 10 hours are suggested to cover *Hand Bending.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction to Hand Bending	
A. Introduction	_____
B. Hand Bending Equipment	_____
C. Geometry Required to Make a Bend	_____
D. Making a 90° Bend	_____
E. Laboratory Trainees practice making 90° bends. This laboratory corresponds to Performance Task 1.	_____
F. Back-to-Back Bends	_____
G. Laboratory Trainees practice making back-to-back bends. This laboratory corresponds to Performance Task 1.	_____
Session II. Offset and Saddle Bends	
A. Making an Offset	_____
B. Parallel Offsets	_____
C. Laboratory Trainees practice making offset bends. This laboratory corresponds to Performance Task 1.	_____
D. Saddle Bends	_____
E. Laboratory Trainees practice making saddle bends. This laboratory corresponds to Performance Task 1.	_____
Session III. Joining Conduit	
A. Cutting, Reaming, and Threading Conduit	_____
B. Laboratory Trainees practice cutting, reaming, and threading conduit. This laboratory corresponds to Performance Task 2.	_____
C. Cutting and Joining PVC Conduit	_____

Session IV. Review and Testing

A. Module Review _____

B. Module Examination _____

1. Trainees must score 70% or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module introduces types and applications of raceways, wireways, and ducts. It stresses the appropriate *NEC®* requirements.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum; Electrical Level One,* Modules 26101-08 through 26107-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Identify and select various types and sizes of raceways and fittings for a given application.
2. Identify various methods used to fabricate (join) and install raceway systems.
3. Identify uses permitted for selected raceways.
4. Demonstrate how to install a flexible raceway system.
5. Terminate a selected raceway system.
6. Identify the appropriate conduit body for a given application.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Identify and select various types and sizes of raceways, fittings, and fasteners for a given application.
2. Demonstrate how to install a flexible raceway system.
3. Terminate a selected raceway system.
4. Identify the appropriate conduit body for a given application.

MATERIALS

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Copy of the latest edition of the *National Electrical Code®*
OSHA Electrical Safety Guidelines (pocket edition)
Sections of EMT
EMT compression fittings
EMT setscrew fittings
Rigid metal conduit and fittings
Plastic-coated RMC and fittings
Aluminum conduit and fittings
Rigid black conduit and fittings
IMC and fittings
EB and DB RNC conduit and fittings
LFNC and connectors
Flexible metal conduit and fittings
Combination couplings
Various conduit couplings
Type C, Type L, Type T, and Type X conduit bodies
Various types of bushings
Threaded waterproof hubs
Insulated bushings
Offset nipples
Concrete, masonry, and wood for fastener application
Assorted hand tools (wrenches, screwdrivers)
Drills/drivers and assorted drill bits
Sample loads
Assorted threaded fasteners, including:
- Bolts
- Cap screws
- Studs
- Machine screws
- Nuts
- Washers

Tie wraps
Assorted special threaded fasteners

Assorted screws, including:
- Wood screws
- Lag screws and shields
- Concrete/masonry screws
- Thread-forming (sheet metal) and thread-cutting screws
- Deck screws
- Drywall screws

Hammer-driven tools and related pin and stud fasteners
Powder-actuated tool, powder charges, and related pin and stud fasteners
Assorted mechanical anchors and assorted anchor fastening tools, including:
- Wedge
- Stud
- Sleeve
- One-piece
- Hammer-driven
- Drop-in
- Expansion shields
- Lead (caulk-in)
- Screw (fiber, lead, plastic)
- Self-drilling
- Toggle bolts
- Sleeve-type
- Wallboard
- Metal drive-in

Metal boxes
Nonmetallic boxes
Bushings and locknuts
Seal fittings and packing material
Liquid sealing compound
Various straps
Standoff support
Hammer
Screwdriver
Access to job site where trainees can observe a variety of wireway components, including:
- Connectors
- End plates
- Closing plates
- Tee fittings
- Crosses
- Elbows
- Nipples
- Slip fittings

Access to job site where trainees can observe a variety of cable tray support systems, including:
- Direct rod
- Trapeze mounting
- Center hung support
- Wall mounting
- Pipe rack mounting

Module Examination*
Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to install and terminate raceway systems. Make sure that all trainees are briefed on appropriate safety procedures. Emphasize hand tool safety.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Benfield Conduit Bending Manual, 2nd Edition. Overland Park, KS: EC&M Books.
National Electrical Code® Handbook, Latest Edition. Quincy, MA: National Fire Protection Association.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 20 hours are suggested to cover *Raceways and Fittings.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction to Raceways and Conduit	
A. Introduction	_____
B. Raceways	_____
C. Conduit	_____
Sessions II and III. Metal Conduit	
A. Metal Conduit Fittings	_____
B. Laboratory Trainees practice identifying conduit bodies. This laboratory corresponds to Performance Task 4.	_____
C. Making a Conduit-to-Box Connection	_____
D. Laboratory Trainees practice terminating conduit. This laboratory corresponds to Performance Task 3.	_____
Session IV. Fittings, Fasteners, and Supports	
A. Seal Fittings	_____
B. Fasteners and Anchors	_____
C. Raceway Supports	_____
D. Laboratory Trainees practice identifying raceways, fittings, and fasteners. This laboratory corresponds to Performance Task 1.	_____
Session V. Wireways and Cable Trays	
A. Wireways	_____
B. Cable Trays	_____
C. Storing Raceways	_____
D. Handling Raceways	_____
E. Ducting	_____
Sessions VI and VII. Construction Methods	
A. Construction Methods	_____
B. Laboratory Trainees practice installing a flexible raceway system. This laboratory corresponds to Performance Task 2.	_____

Session VIII. Review and Testing

A. Module Review _____

B. Module Examination _____

1. Trainees must score 70% or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module focuses on the types and applications of conductors and covers proper wiring techniques. It also stresses the appropriate *NEC*® requirements.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum; Electrical Level One,* Modules 26101-08 through 26108-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. From the cable markings, describe the insulation and jacket material, conductor size and type, number of conductors, temperature rating, voltage rating, and permitted uses.
2. Determine the allowable ampacity of a conductor for a given application.
3. Identify the *NEC*® requirements for color coding of conductors.
4. Install conductors in a raceway system.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Install conductors in a raceway system.

MATERIALS

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Copy of the latest edition of the *National Electrical Code*®
Variety of solid wire conductors
Samples of stranded conductors
Samples of cable, including:
- Type NM
- Type NMC
- Type SE
- Type UF
- Type NMS
- Type MV
- High-voltage shielded
- Type FC
- Type FCC
- Type TC
- Type USE

Instrument control wiring
Power fishing system
Basket grip
Wire grip
Manual wire puller
Power puller
Pull lines
Reel cart
Electrician's hand tools
Access to a conduit run
Module Examination*
Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to install conductors. Make sure that all trainees are briefed on appropriate safety procedures. Emphasize hand tool safety.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

National Electrical Code® Handbook, Latest Edition. Quincy, MA: National Fire Protection Association.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 10 hours are suggested to cover *Conductors and Cables.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction to Conductors	
A. Introduction	_____
B. Wire Size	_____
C. Ampacity	_____
D. Conductor Material	_____
E. Conductor Insulation	_____
Session II. Specialty Conductors	
A. Fixture Wires	_____
B. Cables	_____
C. Instrumentation and Control Wiring	_____
Session III. Installing Conductors in Conduit Systems	
A. Pulling Equipment	_____
B. Safety	_____
C. Feeding Conductors into Conduit	_____
D. Laboratory Trainees practice installing conductors in a raceway system. This laboratory corresponds to Performance Task 1.	_____
E. Terminating Conductors	_____
Session IV. Review and Testing	
A. Module Review	_____
B. Module Examination	_____
1. Trainees must score 70% or higher to receive recognition from NCCER.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	
C. Performance Testing	_____
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	

MODULE OVERVIEW

This module describes the types and uses of construction drawings. It provides information about the format and content of basic electrical construction drawings and their use in conveying specific construction requirements. It describes the standard format for specifications.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum;* and *Electrical Level One,* Modules 26101-08 through 26109-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Explain the basic layout of a set of construction drawings.
2. Describe the information included in the title block of a construction drawing.
3. Identify the types of lines used on construction drawings.
4. Using an architect's scale, state the actual dimensions of a given drawing component.
5. Interpret electrical drawings, including site plans, floor plans, and detail drawings.
6. Interpret equipment schedules found on electrical drawings.
7. Describe the type of information included in electrical specifications.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Using an architect's scale, state the actual dimensions of a given drawing component.
2. Make a material takeoff of the lighting fixtures specified in Performance Profile Sheet 2 using the drawing provided on Performance Profile Sheet 3. The takeoff requires that all lighting fixtures be counted, and where applicable, the total number of lamps for each fixture type must be calculated.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Copy of the latest edition of the *National Electrical Code®*
Set of electrical drawings
Architect's scales (both flat and triangular)
Engineer's scale
Module Examination*
Performance Profile Sheet*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Emphasize basic site safety. This module may require trainees to visit job sites. Make sure that all trainees are briefed on site safety procedures.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference work is suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

National Electrical Code® Handbook, Latest Edition. Quincy, MA: National Fire Protection Association.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 7.5 hours are suggested to cover *Basic Electrical Construction Drawings.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction to the Drawing Set	
A. Introduction to Construction Drawings	_____
B. Drawing Layout	_____
C. Drafting Lines	_____
D. Electrical Symbols	_____
E. Scale Drawings	_____
F. Laboratory Trainees practice using an architect's scale. This laboratory corresponds to Performance Task 1.	_____
Session II. Analyzing Drawings I	
A. Analyzing Electrical Drawings	_____
B. Power Plans	_____
C. Lighting Floor Plan	_____
D. Laboratory Trainees practice preparing a materials takeoff. This laboratory corresponds to Performance Task 2.	_____
E. Electrical Details and Diagrams	_____
Session III. Specifications, Review, and Testing	
A. Written Specifications	_____
B. Module Review	_____
C. Module Examination	_____
1. Trainees must score 70% or higher to receive recognition from NCCER.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	
D. Performance Testing	_____
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	

MODULE OVERVIEW

This module introduces trainees to the various types of devices and installation procedures used in residential wiring. It also covers service-entrance and branch circuit calculations and *National Electrical Code®* requirements.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum;* and *Electrical Level One,* Modules 26101-08 through 26110-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Explain the role of the *National Electrical Code®* in residential wiring and describe how to determine electric service requirements for dwellings.
2. Explain the grounding requirements of a residential electric service.
3. Calculate and select service-entrance equipment.
4. Select the proper wiring methods for various types of residences.
5. Compute branch circuit loads and explain their installation requirements.
6. Explain the types and purposes of equipment grounding conductors.
7. Explain the purpose of ground fault circuit interrupters and tell where they must be installed.
8. Size outlet boxes and select the proper type for different wiring methods.
9. Describe rules for installing electric space heating and HVAC equipment.
10. Describe the installation rules for electrical systems around swimming pools, spas, and hot tubs.
11. Explain how wiring devices are selected and installed.
12. Describe the installation and control of lighting fixtures.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. For a residential dwelling of a given size, and equipped with a given list of major appliances, demonstrate or explain how to:
   - Compute lighting, small appliance, and laundry loads.
   - Compute the loads for large appliances.
   - Determine the number of branch circuits required.
   - Size and select the service-entrance equipment (conductors, panelboard, and protective devices).
2. Using an unlabeled diagram of a panelboard (Performance Profile Sheet 3), label the lettered components.
3. Select the proper type and size outlet box needed for a given set of wiring conditions.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Copy of the latest edition of the *National Electrical Code®*
Calculator
Residential floor plan
Blank worksheet
Various types of GFCIs
Panelboard
Examples of cable, including:
  Type NM
  Type AC
  Type UF
  Type SE/USE

Examples of raceways, including:
- Rigid
- IMC
- EMT
- Flexible
- PVC

Various grounding devices
Examples of made-type grounding electrodes
Assortment of metallic and plastic outlet boxes
Assorted types of electrical receptacles
Assortment of switches, including:
- Single-pole
- Three-way
- Four-way
- Photoelectric switches
- Dimmer

Relays
Module Examination*
Performance Profile Sheet*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Emphasize basic site safety. This module may require trainees to visit job sites. Make sure that all trainees are briefed on site safety procedures.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference work is suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

National Electrical Code® Handbook, Latest Edition. Quincy, MA: National Fire Protection Association.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 15 hours are suggested to cover *Residential Electrical Services.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Sessions I and II. Sizing Electrical Service	
A. Introduction	_____
B. Sizing Electrical Service	_____
C. Sizing Residential Neutral Conductors	_____
D. Sizing the Load Center	_____
E. Laboratory Trainees practice computing various branch loads. This laboratory corresponds to Performance Task 1.	_____
Session III. Grounding	
A. Grounding Electrical Services	_____
B. Main Bonding Jumper	_____
C. Laboratory Trainees practice identifying the components of a panelboard. This laboratory corresponds to Performance Task 2.	_____

Session IV. Installation I

A. Installing the Service Entrance _____
B. Panelboard Location _____
C. Wiring Methods _____
D. Equipment Grounding System _____
E. Branch Circuit Layout for Power _____

Session V. Installation II

A. Branch Circuit Layout for Lighting _____
B. Outlet Boxes _____
C. Laboratory
   Trainees practice selecting the proper type and size outlet box needed for a given set of wiring conditions. This laboratory corresponds to Performance Task 3. _____
D. Wiring Devices _____
E. Lighting Control _____

Session VI. Heating, Pools, Review and Testing

A. Electric Heating _____
B. Residential Swimming Pools, Spas, and Hot Tubs _____
C. Module Review _____
D. Module Examination _____
   1. Trainees must score 70% or higher to receive recognition from NCCER.
   2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.
E. Performance Testing _____
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module introduces the trainee to the uses for electrical test equipment. It covers voltmeters, ohmmeters, clamp-on ammeters, multimeters, megohmmeters, and motor and phase rotation testers. It also covers basic safety and explains category ratings.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum; Electrical Level One,* Modules 26101-08 through 26111-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Explain the operations of and describe the following pieces of test equipment:
   - Voltmeter
   - Ohmmeter
   - Clamp-on ammeter
   - Multimeter
   - Megohmmeter
   - Motor and phase rotation testers
2. Select the appropriate meter for a given work environment based on category ratings.
3. Identify the safety hazards associated with the various types of test equipment.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Under instructor supervision, measure the voltage in your classroom from line to neutral and neutral to ground.
2. Under instructor supervision, use an ohmmeter to measure the value of various resistors.

MATERIALS

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Analog meter
Voltmeter and operator's manual
Voltage tester and operator's manual
Ohmmeter and operator's manual
Continuity tester
Clamp-on ammeter and operator's manual
Multimeter and operator's manual
Megohmmeter and operator's manual
Motor and phase rotation testers and operator's manuals
Resistors
Copy of the latest edition of the *National Electrical Code®*
Safety video/DVD (optional)
TV/Video/DVD player (optional)
Module Examination*
Performance Profile Sheet*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to work with electrical test equipment. Make sure that all trainees are briefed on appropriate safety procedures. Emphasize electrical safety.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

ABCs of Multimeter Safety, Everett, WA: Fluke Corporation.
ABCs of DMMs, Multimeter Features and Functions Explained, Everett, WA: Fluke Corporation.
Clamp Meter ABCs, Everett, WA: Fluke Corporation.
Electronics Fundamentals: Circuits, Devices, and Applications, Thomas L. Floyd. New York: Prentice Hall.
Power Quality Analyzer Uses for Electricians, Everett, WA: Fluke Corporation.
Principles of Electric Circuits, Thomas L. Floyd. New York: Prentice Hall.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 2½ hours are suggested to cover *Electrical Test Equipment*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction to Electrical Meters	
A. Introduction	_____
B. Voltmeter	_____
C. Laboratory Trainees practice measuring voltage. This laboratory corresponds to Performance Task 1.	_____
D. Ohmmeter	_____
E. Laboratory Trainees practice using an ohmmeter. This laboratory corresponds to Performance Task 2.	_____
F. Ammeter and Multimeter	_____
G. Megohmmeter and Other Instruments	_____
H. Category Ratings and Safety	_____
I. Review	_____
J. Module Examination	_____
1. Trainees must score 70% or higher to receive recognition from NCCER.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	
K. Performance Testing	_____
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	