

Electrical

Instructional Framework

An instructional framework provides educators with a list of benchmark statements aligned to Common Core and national content area standards for a given course or program. The Missouri Electrical Instructional Framework lists a sequence of content for the electrical trade, organized into distinct units of instruction with component evidence of mastery statements.

Electrical Instructional Framework

Introductory Craft Skills	Common Core Standards
Module 26101-08 - Orientation to the Electrical Trade	
1. Describe the apprenticeship/training process for electricians.	RST 11-12.2
2. Describe various career paths/opportunities one might follow in the electrical trade.	RST 11-12.2
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.	RST 11-12.2
Module 26102-08 - Electrical Safety	
1. Recognize safe working practices in the construction environment.	
2. Explain the purpose of OSHA and how it promotes safety on the job.	RST 11-12.2
3. Identify electrical hazards and how to avoid or minimize them in the workplace.	RST 11-12.8
4. Explain safety issues concerning lockout/tagout procedures, confined space entry, respiratory protection, and fall protection systems.	RST 11-12.7
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.	S-ID 9, S-IC 6, S-MD 7, RST 11-12.9
Performance Tasks	
1. Perform a visual inspection on various types of ladders.	
2. Set up a ladder properly to perform a task.	F-IF 2, F-IF 4, F-BF 1, F-LE 1, F-LE 5
4. Perform a hazard assessment of a job such as replacing the lights in your classroom. <ul style="list-style-type: none"> • Discuss the work to be performed and the hazards involved. • Locate the closest phone 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. 	RST 11-12.3

Introductory Craft Skills	Common Core Standards
Module 26103-08 - Introduction to Electrical Circuits	
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.	N-Q 1, N-Q 2, N-Q 3, A-CED 4
4. Identify the meters used to measure voltage, current, and resistance.	N-Q 1, N-Q 2, N-Q 3
5. Explain the basic characteristics of series and parallel circuits.	G-GMD 4, G-MG 1
Module 26104-08 - Electrical Theory	
1. Explain the basic characteristics of combination circuits.	
4. Using Ohm's law, find the unknown parameters in series, parallel, and series-parallel circuits.	N-Q 1, N-Q 2, N-Q 3, A-SSE 1 A-CED 4, A-REI 1
Module 26105-08 - Introduction to the National Electrical Code®	
1. Explain the purpose and history of the <i>NEC</i> ®.	RI 11-12.1
2. Describe the layout of the <i>NEC</i> ®.	RI 11-12.4
3. Demonstrate how to navigate the <i>NEC</i> ®.	RI 11-12.5
4. Describe the purpose of the National Electrical Manufacturers Association and the NFPA.	RI 11-12.6
5. Explain the role of nationally recognized testing laboratories.	RI 11-12.8
Performance Tasks	
1. Use <i>NEC Article 90</i> to determine the scope of the <i>NEC</i> ®. State what is covered by the <i>NEC</i> ® and what is not.	RI 11-12.1
2. Find the definition of the term <i>feeder</i> in the <i>NEC</i> ®.	RI 11-12.3
3. Look up the <i>NEC</i> ® specifications that you would need to follow if you were installing an outlet near a swimming pool.	RI 11-12.4
4. Find the minimum wire bending space for two 1/0 AWG conductors installed in a junction box or cabinet and entering opposite the terminal.	G-MG 1, G-MG 2, G-MG 3, N-Q 1, N-Q 2, N-Q 3, RI 11-12.5
Module 26106-08 - Device Boxes	
1. Describe the different types of nonmetallic and metallic boxes.	
2. Calculate the <i>NEC</i> ® fill requirements for boxes under 100 cubic inches.	N-Q 1, N-Q 2, N-Q 3, A-CED 1, A-CED 2, A-CED 3, A-CED 4, F-IF 1, F-IF 4, F-IF 5, F-IF 6
3. Identify the appropriate box type and size for a given application.	N-Q 1, N-Q 2, N-Q 3, F-IF 1, F-IF 2, F-IF 4, F-IF 5, F-IF 6
4. Select and demonstrate the appropriate method for mounting a given box.	RST 11-12.3
Performance Tasks	

Introductory Craft Skills	Common Core Standards
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: <ul style="list-style-type: none"> • Conduit entering and exiting for a straight pull • Conduit entering and exiting at an angle 	N-Q 1, N-Q 2, N-Q 3, A-CED 1, A-CED 2, A-CED 3, A-CED 4, F-IF 1, F-IF 4, F-IF 5, F-IF 6
Module 26107-08 - Hand Bending®	
1. Identify the methods for hand bending and installing conduit.	RST 11-12.4
2. Determine conduit bends.	N-Q 1, N-Q 2, N-Q 3, G-C 2, G-C 5, G-GMD 4, G-GM 1, G-GM 3
3. Make 90-degree bends, back-to-back bends, offsets, kicks, and saddle bends using a hand bender.	N-Q 1, N-Q 2, N-Q 3, G-C 2, G-C 5, G-GMD 4, G-GM 1, G-GM 3, RST 11-12.3
4. Cut, ream, and thread conduit.	N-Q 1, N-Q 2, N-Q 3
Performance Tasks	
1. Make 90-degree bends, back-to-back bends, offsets, kicks, and saddle bends using a hand bender.	RST 11-12.3
2. Cut, ream, and thread conduit.	
Module 26108-08 - Raceways and Fittings	
1. Identify and select various types and sizes of raceways and fittings for a given application.	N-Q 1, N-Q 2, N-Q 3, G-GMD 4, G-GM 1, G-GM 3
2. Identify various methods used to fabricate (join) and install raceway systems.	G-GMD 4, G-GM 1, G-GM 3
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	
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.	
Module 26109-08 - Conductors and Cables	
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.	S-IC 6
2. Determine the allowable ampacity of a conductor for a given application.	N-Q 1, N-Q 2, N-Q 3, S-IC 6
3. Identify the <i>NEC</i> ® requirements for color coding of conductors.	F-IF 1, RST 11-12.9

Introductory Craft Skills	Common Core Standards
4. Install conductors in a raceway system.	RST 11-12.3
Performance Tasks	
1. Install conductors in a raceway system.	
Module 26110-08 - Basic Electrical Construction Drawings	
1. Explain the basic layout of a set of construction drawings.	N-Q 1, N-Q 2, N-Q 3, G-CO 2, G-CO 3, G-CO 5, G-CO 6, G-SRT 2, G-SRT 5, G-SRT 8, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
2. Describe the information included in the title block of a construction drawing.	N-Q 1, N-Q 2, N-Q 3, RST 11-12.4
3. Identify the types of lines used on construction drawings.	G-GMD 4, G-MG 1
4. Using an architect's scale, state the actual dimensions of a given drawing component.	N-Q 1, N-Q 2, N-Q 3
5. Interpret electrical drawings, including site plans, floor plans, and detail drawings.	N-Q 1, N-Q 2, N-Q 3, G-CO 2, G-CO 3, G-CO 5, G-CO 6, G-SRT 2, G-SRT 5, G-SRT 8, G-GMD 4, G-MG 1, G-MG 2, G-MG 3, RST 11-12.4
6. Interpret equipment schedules found on electrical drawings.	G-GMD 4
7. Describe the type of information included in electrical specifications.	RST 11-12.4
Performance Tasks	
1. Using an architect's scale, state the actual dimensions of a given drawing component.	N-Q 1, N-Q 2, N-Q 3
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.	A-CED 1, A-REI 1, F-IF 1, F-IF 2, F-IF 3, F-IF 4, F-IF 5, F-IF 6, F-BF 1, F-BF 2, F-LE 1b, F-LE 2, F-LE 5, RST 11-12.9
Module 26111-08 - Residential Electrical Services	
1. Explain the role of the National Electrical Code® in residential wiring and describe how to determine electric service requirements for dwellings.	S-ID 9, S-IC 6, S-MD 7, RST 11-12.3
2. Explain the grounding requirements of a residential electric service.	RST 11-12.2

Introductory Craft Skills	Common Core Standards
3. Calculate and select service-entrance equipment.	N-Q 1, N-Q 2, N-Q 3, G-GMD 4, G-MG 1, G-MG 2, G-MG 3, A-CED 1, A-REI 1, F-IF 1, F-IF 2, F-IF 3, F-IF 4, F-IF 5, F-IF 6, F-BF 1, F-BF 2, F-LE 1b, F-LE 2, F-LE 5
4. Select the proper wiring methods for various types of residences.	
5. Compute branch circuit loads and explain their installation requirements.	N-Q 1, N-Q 2, N-Q 3, G-GMD 4, G-MG 1, G-MG 2, G-MG 3, A-CED 1, A-REI 1, F-IF 1, F-IF 2, F-IF 3, F-IF 4, F-IF 5, F-IF 6, F-BF 1, F-BF 2, F-LE 1b, F-LE 2, F-LE 5
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.	RST 11-12.2
8. Size outlet boxes and select the proper type for different wiring methods.	N-Q 1, N-Q 2, N-Q 3, A-CED 1, A-CED 2, A-CED 3, A-CED 4, F-IF 1, F-IF 4, F-IF 5, F-IF 6, RST 11-12.4
9. Describe rules for installing electric space heating and HVAC equipment.	RST 11-12.2
10. Describe the installation rules for electrical systems around swimming pools, spas, and hot tubs.	RST 11-12.2
11. Explain how wiring devices are selected and installed.	RST 11-12.2
12. Describe the installation and control of lighting fixtures.	RST 11-12.2
Performance Tasks	
1. For a residential dwelling of a given size, and equipped with a given list of major appliances, demonstrate or explain how to: <ul style="list-style-type: none"> • Compute the 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). 	N-Q 1, N-Q 2, N-Q 3, G-GMD 4, G-MG 1, G-MG 2, G-MG 3, A-CED 1, A-REI 1, F-IF 1, F-IF 2, F-IF 3, F-IF 4, F-IF 5, F-IF 6, F-BF 1, F-BF 2, F-LE 1b, F-LE 2, F-LE 5
2. Using an unlabeled diagram of a panelboard (Performance Profile Sheet 3), label the lettered components.	RST 11-12.4

Introductory Craft Skills	Common Core Standards
3. Select the proper type and size outlet box needed for a given set of wiring conditions.	N-Q 1, N-Q 2, N-Q 3, A-CED 1, A-CED 2, A-CED 3, A-CED 4, F-IF 1, F-IF 4, F-IF 5, F-IF 6
Module 26112-08 - Electrical Test Equipment	
1. Explain the operation of and describe the following pieces of test equipment: <ul style="list-style-type: none"> • Voltmeter • Ohmmeter • Clamp-on ammeter • Multimeter • Motor and phase rotation testers 	RST 11-12.2 N-Q 1, N-Q 2, N-Q 3
2. Select the appropriate meter for a given work environment based on category ratings.	N-Q 1, N-Q 2, N-Q 3, RST 11-12.9
3. Identify the safety hazards associated with various types of test equipment.	
Performance Tasks	
1. Under instructor supervision, measure the voltage in your classroom from line to neutral and neutral to ground.	N-Q 1, N-Q 2, N-Q 3, RST 11-12.3
2. Under instructor supervision, use an ohmmeter to measure the value of various resistors.	N-Q 1, N-Q 2, N-Q 3, RST 11-12.3
Module 26202-08 - Motors: Theory and Application	
5. Explain how the direction of a three-phase motor is changed.	S-ID 9, S-IC 6, RST 11-12.2
9. Describe the methods for determining various motor connections.	S-ID 9, S-IC 6, RST 11-12.2
Performance Tasks	
1. Collect data from a motor nameplate.	S-ID 9, S-IC 6, RST 11-12.4
2. Identify various types of motors and their application(s).	
Module 26203-08 - Electric Lighting	
1. Describe the characteristics of light.	
2. Recognize the different kinds of lamps and explain the advantages and disadvantages of each type: <ul style="list-style-type: none"> • Incandescent • Halogen • Fluorescent • High-intensity discharge (HID) 	RST 11-12.9
3. Properly select and install various lamps in lighting fixtures.	

Introductory Craft Skills	Common Core Standards
4. Recognize and describe the installation requirements for various types of lighting fixtures: <ul style="list-style-type: none"> • Surface-mounted • Recessed • Suspended • Track-mounted 	RST 11-12.9
5. Recognize ballasts and describe their use in fluorescent and HID lighting fixtures.	
6. Explain the relationship of Kelvin temperature to the color of light produced by a lamp.	F-IF 1, F-IF 4, F-IF 5, F-IF 6, F-LE 1, F-LE 2, F-LE 5, RST 11-12.2
7. Recognize basic occupancy sensors, photoelectric sensors, and timers used to control lighting circuits and describe how each device operates.	
Performance Tasks	
1. Read and interpret information given in lamp manufacturers' catalogs for one or more selected lamps.	
2. Properly select and install lamps into lighting fixtures.	
3. Install one or more of the following lighting fixtures and their associated lamps: <ul style="list-style-type: none"> • Surface-mounted • Recessed • Suspended • Track-mounted 	RST 11-12.3
Module 26204-08 - Conduit Bending	
1. Describe the process of conduit bending using power tools.	RST 11-12.2
2. Identify all parts of electric and hydraulic benders.	
3. Bend offsets, kicks, saddles, segmented, and parallel bends.	N-Q 1, N-Q 2, N-Q 3, G-CO 1, G-CO 2, G-CO 4, G-CO 5, G-CO 6, G-CO 12, G-C 2, G-C 4, G-C 5, G-GPE 6, G-GMD 4, G-GM 1, G-GM 3
4. Explain the requirements of the National Electrical Code® (NEC®) for bending conduit.	RST 11-12.2
5. Compute the radius, degrees in bend, developed length, and gain for conduit up to six inches.	N-Q 1, N-Q 2, N-Q 3, G-CO 1, G-CO 2, G-CO 4, G-CO 5, G-CO 6, G-CO 12, G-C 2, G-C 4, G-C 5, G-GPE 6, G-GMD 4, G-GM 1, G-GM 3

Introductory Craft Skills	Common Core Standards
Performance Tasks	
1. Use an electric or hydraulic bender to bend a conduit stub-up to an exact distance of 15 1/4" above the deck.	N-Q 1, N-Q 2, N-Q 3, G-CO 1, G-CO 2, G-CO 4, G-CO 5, G-CO 6, G-CO 12, G-C 2, G-C 4, G-C 5, G-GPE 6, G-GMD 4, G-GM 1, G-GM 3, RST 11-12.3
2. Make an offset in a length of conduit to miss a 10" high obstruction with a clearance between the obstruction and the conduit of not less than 1" nor more than 1 1/2".	N-Q 1, N-Q 2, N-Q 3, G-CO 1, G-CO 2, G-CO 4, G-CO 5, G-CO 6, G-CO 12, G-C 2, G-C 4, G-C 5, G-GPE 6, G-GMD 4, G-GM 1, G-GM 3, RST 11-12.3
3. Make a saddle in a length of conduit to cross an 8" pipe with 1" clearance between the pipe and the conduit.	N-Q 1, N-Q 2, N-Q 3, G-CO 1, G-CO 2, G-CO 4, G-CO 5, G-CO 6, G-CO 12, G-C 2, G-C 4, G-C 5, G-GPE 6, G-GMD 4, G-GM 1, G-GM 3, RST 11-12.3
Module 26205-08 - Pull and Junction Boxes	
1. Describe the different types of nonmetallic and metallic pull and junction boxes.	
2. Properly select, install, and support pull and junction boxes and their associated fittings.	N-Q 1, N-Q 2, N-Q 3, A-CED 1, A-CED 2, A-CED 3, A-CED 4, F-IF 1, F-IF 2, F-IF 4, F-IF 5, F-IF 6, RST 11-12.9
3. Describe the National Electrical Code® (NEC®) regulations governing pull and junction boxes.	S-IC 6, SL 11-12.4
4. Size pull and junction boxes for various applications.	N-Q 1, N-Q 2, N-Q 3, A-CED 1, A-CED 2, A-CED 3, A-CED 4, F-IF 1, F-IF 2, F-IF 4, F-IF 5, F-IF 6
5. Understand the NEMA and IP classifications for pull and junction boxes.	
6. Describe the purpose of conduit bodies and Type FS boxes.	SL 11-12.4

Introductory Craft Skills	Common Core Standards
Performance Tasks	
1. Identify various NEMA boxes.	
2. Properly select, install, and support pull and junction boxes over 100 cubic inches in size.	N-Q 1, N-Q 2, N-Q 3, A-CED 1-4, F-IF 1, F-IF 2, F-IF 4, F-IF 5, F-IF 6
3. Identify various conduit bodies and fittings.	
Module 26206-08 - Conductor Installations	
1. Explain the importance of communication during a cable-pulling operation.	RST 11-12.2
2. Plan and set up for a cable pull.	
3. Set up reel stands and spindles for a wire-pulling installation.	
4. Explain how mandrels, swabs, and brushes are used to prepare conduit for conductors.	SL 11-12.4
5. Properly install a pull line for a cable-pulling operation.	
6. Explain how and when to support conductors in vertical conduit runs.	RST 11-12.2
7. Describe the installation of cables in cable trays.	
8. Calculate the probable stress or tension in cable pulls.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-ID 9, S-IC 6, S-MD 7, A-CED 1, A-CED 4, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
Performance Tasks	
1. Prepare multiple conductors for pulling in a raceway system.	
2. Prepare multiple conductors for pulling using a wire-pulling basket.	
Module 26208-08 - Conductor Terminations and Splices	
1. Describe how to make a good conductor termination.	S-ID 9, S-MD 7, RST 11-12.2
2. Prepare cable ends for terminations and splices and connect using lugs or connectors.	RST 11-12.4
3. Train cable at termination points.	
4. Understand the <i>National Electrical Code® (NEC®)</i> requirements for making cable terminations and splices.	
5. Demonstrate crimping techniques.	
6. Select the proper lug or connector for the job.	

Introductory Craft Skills	Common Core Standards
Module 26209-08 - Grounding And Bonding	
1. Explain the purpose of grounding and bonding and the scope of <i>NEC Article 250</i> .	RST 11-12.2
2. Distinguish between a short circuit and a ground fault.	
3. Define the <i>National Electrical Code®</i> requirements related to bonding and grounding.	
4. Distinguish between grounded systems and equipment grounding.	
6. Explain the function of the grounding electrode system and determine the grounding electrodes to be used.	RST 11-12.2
8. Use <i>NEC Table 250.122</i> to size the equipment grounding conductor for raceways and equipment.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-IC 6
9. Explain the function of the main and system bonding jumpers in the grounding system and size the main and system bonding jumpers for various applications.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-IC 6, S-MD 7, RST 11-12.2
10. Size the main bonding jumper for a service utilizing multiple service disconnecting means.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-IC 6, S-MD 7, A-CED 1, A-REI 1
11. Explain the importance of bonding equipment in clearing ground faults in a system.	RST 11-12.2
12. Explain the purposes of the grounded conductor (neutral) in the operation of overcurrent devices.	RST 11-12.2
Performance Tasks	
1. Using the proper fittings, connect one end of a No. 4 AWG bare copper grounding wire to a length of 3/4" galvanized water pipe and the other end to the correct terminal in a main panelboard.	N-Q 1, N-Q 2, N-Q 3
2. Install two lengths of Type NM cable in a switch box using Type NM cable clamps: <ul style="list-style-type: none"> • Strip the ends of the cable to conform with NEC® requirements. • Secure the cable in the switch box and tighten the cable clamps. • Connect and secure the equipment grounding conductors according to NEC® requirements, and secure to the switch box with either a ground clip or a grounding screw. 	N-Q 1, N-Q 2, N-Q 3, RST 11-12.3
3. Size the minimum required grounding electrode conductor for a 200A service fed by 3/0 copper.	N-Q 1, N-Q 2, N-Q 3, F-IF 4
4. Size the minimum required equipment grounding conductor in each conduit for a 400A feeder gap using two parallel runs of 3/0 copper.	N-Q 1, N-Q 2, N-Q 3, F-IF 4
5. Size the minimum required bonding jumper for a copper water pipe near a separately derived system (transformer) where the secondary conductors are 500 kcmil copper.	N-Q 1, N-Q 2, N-Q 3, F-IF 4

Introductory Craft Skills	Common Core Standards
Module 26210-08 - Circuit Breakers and Fuses	
1. Explain the necessity of overcurrent protection devices in electrical circuits.	RST 11-12.2
2. Define the terms associated with fuses and circuit breakers.	
3. Describe the operation of a circuit breaker.	RST 11-12.2
4. Apply the <i>National Electrical Code® (NEC®)</i> requirements for overcurrent devices.	N-Q 1, N-Q 2, N-Q 3, F-IF 4
5. Describe the operation of single-element and time-delay fuses.	
Performance Tasks	
1. Identify the following on one or more circuit breaker(s) and fuse(s): <ul style="list-style-type: none"> • Number of poles • Load rating • Voltage rating • Amperage interrupting rating 	RST 11-12.4 N-Q 1, N-Q 2, N-Q 3
Module 26211-08 - Control Systems and Fundamental Concepts	
1. Describe the operating principles of contactors and relays.	
2. Select contactors and relays for use in specific electrical systems.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-ID 9, S-IC 6, S-MD 7, A-CED 1, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
3. Explain how mechanical contactors operate.	
4. Explain how solid-state contactors operate.	
5. Install contactors and relays according to the <i>NEC®</i> requirements.	
6. Select and install contactors and relays for lighting control.	
7. Read wiring diagrams involving contactors and relays.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-ID 9, S-IC 6, S-MD 7, A-CED 1, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
8. Describe how overload relays operate.	
9. Connect a simple control circuit.	
10. Test control circuits.	
Module 26301-08 - Load Calculations- Branch and Feeder Circuits	
1. Calculate loads for single-phase and three-phase branch circuits.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-IC 6, S-MD 7, A-CED 1, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3

Introductory Craft Skills	Common Core Standards
2. Size branch circuit overcurrent protection devices (circuit breakers and fuses) for noncontinuous duty and continuous duty circuits.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-IC 6, S-MD 7, A-CED 1, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
3. Apply derating factors to size branch circuits.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-IC 6, S-MD 7, A-CED 1, A-REI 1
4. Calculate ampacity for single-phase and three-phase loads.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-IC 6, S-MD 7, A-CED 1, A-CED 2, A-CED 3, A-CED 4, A-REI 1
5. Use load calculations to determine branch circuit conductor sizes.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-IC 6, S-MD 7, A-CED 1, A-REI 1
6. Use <i>NEC Table 220.55</i> to calculate residential cooking equipment loads.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-IC 6, S-MD 7, A-CED 1, A-REI 1
7. Select branch circuit conductors and overcurrent protection devices for electric heat, air conditioning equipment, motors, and welders.	
Module 26302-08 - Conductor Selection and Calculations	
1. Select electrical conductors for specific applications.	
2. Calculate voltage drop in both single-phase and three-phase applications.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-ID 9, S-IC 6, S-MD 7, A-CED 1, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
3. Apply <i>National Electrical Code® (NEC®)</i> regulations governing conductors to a specific application.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, , S-ID 9, S-IC 6, S-MD 7, A-CED 1, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
4. Calculate and apply <i>NEC®</i> tap rules to a specific application.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-ID 9, S-IC 6, S-MD 7, A-CED 1, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
5. Size conductors for the load.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-ID 9, S-IC 6, S-MD 7, A-CED 1, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3

Introductory Craft Skills	Common Core Standards
6. Derate conductors for fill, temperature, and voltage drop.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-ID 9, S-IC 6, S-MD 7, A-CED 1, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
7. Select conductors for various temperature ranges and atmospheres.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-ID 9, S-IC 6, S-MD 7, A-CED 1, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
Module 26303-08 - Practical Applications of Lighting	
2. Classify lighting fixtures by type and application.	
5. Identify various dimming systems and their components.	
6. Use manufacturers' lighting fixture catalogs to select the appropriate lighting fixtures for specific lighting applications.	
1. Explain how the lighting terms lumen, candlepower, and footcandle relate to one another.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, F-LE 5, S-IC 6, A-CED 1, A-CED 2, A-CED 3, A-CED 4, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
3. Identify the general lighting pattern produced by each type of fixture.	G-CO 2, G-SRT 1, G-SRT 2, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
4. Identify the lighting requirements associated with lighting systems used in selected applications such as office buildings, schools, theaters, hazardous areas, etc.	
Performance Tasks	
1. Using manufacturers' catalogs, select the appropriate lighting fixtures for specific lighting situations.	
2. While touring selected structures to observe their lighting systems: <ul style="list-style-type: none"> • Identify the various types of lighting fixtures used. • Explain the specific purpose(s) served by the different fixtures. • Identify the lighting system class of service. 	
Module 26304-08 - Hazardous Locations	
1. Define the various classifications of hazardous locations.	
2. Describe the wiring methods permitted for branch circuits and feeders in specific hazardous locations.	RST 11-12.2
Performance Tasks	

Introductory Craft Skills	Common Core Standards
<p>1. Using two rigid metal conduit nipples, a sealing fitting, three pieces of No. 12 THHN conductors, and a packing fiber/sealing kit, perform the following operations:</p> <ul style="list-style-type: none"> • Secure one conduit nipple in each end of the seal. • Make sure the required number of threads are engaged. • Pull the three THHN conductors through the nipples and seal so that about 6" is protruding from each nipple. • Pack the fiber following the instructions furnished with the sealing kit. • Mix the sealing compound. • Position the unit in the required location and pour in the sealing compound. 	RST 11-12.3
Module 26305-08 - Overcurrent Protection	
1. Apply the key <i>National Electrical Code® (NEC®)</i> requirements regarding overcurrent protection.	
2. Check specific applications for conformance to <i>NEC®</i> sections that cover short circuit current, fault currents, interrupting ratings, and other sections relating to overcurrent protection.	
4. Select and size overcurrent protection for specific applications.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-ID 9, S-IC 6, S-MD 7, A-CED 1, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
Module 26309-08 - Motor Calculations	
1. Size branch circuits and feeders for electric motors.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-ID 9, S-IC 6, S-MD 7, A-CED 1, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
2. Size and select overcurrent protective devices for motors.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-ID 9, S-IC 6, S-MD 7, A-CED 1, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
Module 26401-08 - Load Calculations - Feeders and Services	
1. Size feeders and services in accordance with <i>National Electrical Code® (NEC®)</i> requirements.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-ID 9, S-IC 6, S-MD 7, A-CED 1, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3

Introductory Craft Skills	Common Core Standards
2. Calculate loads and ampacities for single-phase and three-phase feeders.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, S-ID 9, S-IC 6, S-MD 7, A-CED 1, A-REI 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
Module 26413-08 - Introductory Skills for the Crewleader	
Chapter One	
1. Discuss the growth and economic conditions of the construction industry.	SL 11-12.4
2. Describe how workers' values have changed over the years.	SL 11-12.4
3. Explain the importance of training for construction industry personnel.	RST 11-12.2
4. List the new technologies available, and discuss how they are helpful to the construction industry.	
5. Identify the gender and minority issues associated with a changing workforce.	SL 11-12.4
6. Describe what employers can do to prevent workplace discrimination.	RST 11-12.2
7. Differentiate between formal and informal organizations.	RST 11-12.9
8. Describe the difference between authority and responsibility.	
9. Explain the purpose of job descriptions and what they should include.	RST 11-12.2
10. Distinguish between company policies and procedures.	
Chapter Two	
1. Explain the role of a crew leader.	RST 11-12.2
2. List the characteristics of effective leaders.	
3. Be able to discuss the importance of ethics in a supervisor's role.	SL 11-12.4
4. Identify the three styles of leadership.	
5. Describe the forms of communication.	SL 11-12.4
6. Explain the four parts of verbal communication.	RST 11-12.2
7. Demonstrate the importance of active listening.	
8. Illustrate how to overcome the barriers to communication.	
9. List some ways that supervisors can motivate their employees.	
10. Explain the importance of delegating and implementing policies and procedures.	RST 11-12.2
11. Differentiate between problem solving and decision making.	RST 11-12.9
Chapter Three	
1. Demonstrate an understanding of the importance of safety.	
2. Give examples of direct and indirect costs of workplace accidents.	SL 11-12.4
3. Identify safety hazards of the construction industry.	RST 11-12.8

Introductory Craft Skills	Common Core Standards
4. Explain the purpose of the Occupational Safety and Health Act (OSHA).	
5. Discuss OSHA inspection programs.	
6. Identify the key points of a safety program.	
9. Explain the importance of having employees trained in first aid and Cardio-Pulmonary Resuscitation	SL 11-12.4
(CPR) on the job site.	
Module 26501-09 - Managing Electrical Hazards	
1. Identify types of electrical hazards and locations, and explain related safety guidelines and terms.	
2. Recognize and explain hazard boundaries.	
3. Explain employer and employee responsibilities in recognizing and managing electrical hazards.	RST 11-12.8
4. List common factors that lead to electrical incidents and explain the importance of using appropriate procedures and safe work practices.	RST 11-12.8
5. Analyze the electrical hazards of a given task, plan the job, and complete an electrical work permit request.	RST 11-12.8
6. Select, inspect, and maintain personal protective equipment (PPE) and test equipment used for electrical work.	
7. Explain how to create an electrically safe work condition.	SL 11-12.4

Codes for Common Core English Language Arts and Literacy are:

L = Language

RI = Reading for Informational
Text

RST = Reading for Literacy in
Science and Technical
Subjects

SL = Speaking and Listening

W = Writing

WHST = Writing for Literacy in
History/Social Studies,
Science, and Technical
Subjects

Codes for Common Core Mathematics are:

A-SSE = Algebra: Seeing
Structure in Expressions

A-CED = Algebra: Creating
Equations

A-REI = Algebra: Reasoning with
Equations and Inequalities

F-IF = Functions: Interpreting
Functions

F-BF = Functions: Building
Functions

F-LE = Functions: Linear,
Quadratic, and Exponential
Models

F-TF = Functions: Trigonometric
Functions

G-CO = Geometry: Congruence

G-SRT = Similarity, right
Triangles, and
Trigonometry

G-GPE = Geometry: Expressing
Geometric Properties with
Equations

G-GMD = Geometry: Geometric
Measurement and
Dimension

G-MG = Geometry: Modeling with
Geometry

N-RN = Number and Quantity:
The Real Number System

N-Q = Number and Quantity:
Quantities

S-ID = Statistics and Probability:
Interpreting Categorical and
Quantitative Data

S-IC = Statistics and Probability:
Making Inferences and
Justifying Conclusions

S-MD = Statistics and Probability:
Using Probability to Make
Decisions