

# STRANDS AND STANDARDS

## ELECTRICIAN 1



### Course Description

A program with a sequence of courses that prepares individuals to apply technical knowledge and skills to assemble, install, operate, maintain, and repair electrically energized systems, such as residential, commercial, industrial electric-power systems wiring, D.C. and A.C. motors, controls, and electrical distribution panels. Includes instruction in the use of advanced technology test equipment.

<b>Intended Grade Level</b>	10-12
Units of Credit	0.5
Core Code	40.08.00.00.050
Concurrent Enrollment Core Code	40.08.00.13.050
Prerequisite	None
Skill Certification Test Number	Industry test 952
Test Weight	1.0
<b>License Area of Concentration</b>	CTE and/or Secondary Education 6-12
<b>Required Endorsement(s)</b>	
Endorsement 1	Electrician
Endorsement 2	N/A
Endorsement 3	N/A

## STRAND 1

**Students will participate in personal and leadership development activities through SkillsUSA or another appropriate career and technical student organization.**

### Standard 1

Student will use communication skills to effectively communicate with others.

- Understand when it is appropriate to listen and to speak.
- Understand and follow verbal and written instructions for classroom and laboratory activities.

### Standard 2

Student will effectively use teamwork to respectfully work with others.

- Identify and understand different roles in working with a team.

### Standard 3

Student will use critical thinking and problem-solving skills.

- Analyze the cause of the problem.
- Develop a solution to address the problem.
- Implement the plan.
- Evaluate the effectiveness of the plan.

### Standard 4

Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

- Set and meet goals on attendance and punctuality.
- Prioritize, plan, and manage work to complete assignments and projects on time.

### Standard 5

Student will be accountable for results.

- Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
- File a regular written report on progress toward completion of assignments and projects.

### Standard 6

Be familiar with the legal requirements and expectations of the course.

- Be familiar with the course disclosure statement and all requirements for successful completion of the course.
- Demonstrate workplace ethics, e.g., fair, honest, disciplined.

## STRAND 2

**Students will participate in work-place readiness activities.**

### Standard 1

Student will demonstrate employability skills.

- Use a career search network to find career choices.
- Write a resume including a list of demonstrated skills.
- Write a letter of application.
- Complete a job application.
- Participate in an actual or simulated job interview.

**Standard 2**

Student will participate in a work-based learning experience outside the classroom.

- Student will plan and implement a work-based learning experience aligned with their career goal.

**STRAND 3**

**Students will understand electrical safety.**

**Standard 1**

Demonstrate safe working procedures in a construction environment.

**Standard 2**

Explain the purpose of OSHA and how it promotes safety on the job.

**Standard 3**

Identify electrical hazards and how to avoid or minimize them in the workplace.

**Standard 4**

Explain safety issues concerning lockout/tagout procedures, personal protection using assured grounding and isolation programs, confirm space entry and fall protection systems.

**Performance Skills**

Understand electrical safety.

- Demonstrate safe working procedures in a construction environment.
- Explain the purpose of OSHA and how it promotes safety on the job.
- Identify electrical hazards and how to avoid or minimize them in the workplace.
- Explain safety issues concerning lockout/tagout procedures, personal protection using assured grounding and isolation programs, confirm space entry and fall protection systems.

**STRAND 4**

**Students will understand hand bending.**

**Standard 1**

Identify the methods of hand bending conduit.

**Standard 2**

Identify the various methods used to install conduit.

**Standard 3**

Use math formulas to determine conduit bends.

**Standard 4**

Mark 90 degree bends, back-to-back bends, offsets, kicks, and saddle bends using a hand bender.

**Performance Skills**

Understand and demonstrate hand bending.

- Identify the methods of hand bending conduit.
- Identify the various methods used to install conduit.
- Use math formulas to determine conduit bends.
- Mark 90 degree bends, back-to-back bends, offsets, kicks, and saddle bends using a hand bender.

## STRAND 5

Students will understand electrical theory.

### Standard 1

Recognize what atoms are and how they are constructed.

### Standard 2

Define voltage and identify the ways in which it can be produced.

### Standard 3

Explain the difference between conductors and insulators.

### Standard 4

Define the units of measurement that are used to measure the properties of electricity.

### Standard 5

Explain how voltage, current, and resistance are related to each other.

### Standard 6

Using the formula of Ohm's Law, calculate an unknown value.

### Standard 7

Explain the different types of meters used to measure voltage, current, and resistance.

### Standard 8

Using the power formula, calculate the amount of power used by a circuit.

## Performance Skills

Understand and apply electrical theory.

- Recognize what atoms are and how they are constructed.
- Define voltage and identify the ways in which it can be produced.
- Explain the difference between conductors and insulators.
- Define the units of measurement that are used to measure the properties of electricity.
- Explain how voltage, current, and resistance are related to each other.
- Using the formula of Ohm's Law, calculate an unknown value.
- Explain the different types of meters used to measure voltage, current, and resistance.
- Using the power formula, calculate the amount of power used by a circuit.

## STRAND 6

Students will understand electrical test equipment.

### Standard 1

Explain the operation of and describe the following pieces of test equipment:

- Ammeter
- Volt meter
- Ohm meter
- Continuity tester
- Voltage tester

**Standard 2**

Explain the importance of proper meter polarity.

**Standard 3**

Explain the difference between digital and analog meters.

**Performance Skills**

Type Performance Skills Here Understand and demonstrate electrical test equipment.

- Explain the operation of specified test equipment.
- Explain the importance of proper meter polarity.
- Explain the difference between digital and analog meters.

**STRAND 7**

**Students will understand an Introduction to the National Electrical Code.**

**Standard 1**

Explain the purpose and history of the National Electric Code (NEC).

**Standard 2**

Describe the layout of the NEC.

**Standard 3**

Explain how to navigate the NEC.

**Standard 4**

Describe the purpose of the National Electrical Manufacturers' Association (NEMA) and the National Fire Protection Association (NFPA).

**Standard 5**

Explain the role of testing laboratories.

**Performance Skills**

Identify the National Electrical Code.

- Explain the purpose and history of the National Electric Code (NEC).
- Describe the layout of the NEC.
- Explain how to navigate the NEC.
- Describe the purpose of the National Electrical Manufacturers' Association (NEMA) and the National Fire Protection Association (NFPA).
- Explain the role of testing laboratories.

**STRAND 8**

**Students will understand raceways, boxes, and raceway fittings.**

**Standard 1**

Identify and select various types and sizes of raceways.

**Standard 2**

Identify and select various types of raceway fittings.

**Standard 3**

Identify various methods used to install raceways.

**Standard 4**

Demonstrate knowledge of NEC raceway requirements.

**Standard 5**

Describe procedures for installing raceways and boxes in a wood frame environment.

**Standard 6**

Describe procedures for installing raceways and boxes on drywall surfaces.

**Standard 7**

Recognize safety precautions that must be followed when working with boxes and raceways.

**Performance Skills**

Understand the application of raceways, boxes, and fittings

- Identify and select various types and sizes of raceways.
- Identify and select various types of raceway fittings.
- Identify various methods used to install raceways.
- Demonstrate knowledge of NEC raceway requirements.
- Describe procedures for installing raceways and boxes in a wood frame environment.
- Describe procedures for installing raceways and boxes on drywall surfaces.
- Recognize safety precautions that must be followed when working with boxes and raceways.

**STRAND 9**

**Students will understand conductors.**

**Standard 1**

Explain the various sizes and gauges of wire in accordance with American Wire Gauge Standards.

**Standard 2**

Identify insulation and jacket types according to conditions and applications.

**Standard 3**

Describe voltage ratings of conductors and cables.

**Standard 4**

Read and identify markings on conductors and cables.

**Standard 5**

Use the tables in NEC to determine the ampacity of a conductor.

**Standard 6**

State the purpose of stranded wire.

**Standard 7**

Describe the different materials from which conductors are made.

**Standard 8**

Describe the different types of conductor insulation.

**Standard 9**

Describe the color coding of insulation.

**Standard 10**

Describe the procedure for pulling wire through conduit.

**Standard 11**

Install conductors in conduit.

**Standard 12**

Pull conductors in a conduit system.

**Performance Skills**

Understand and how to apply conductors in a safe way.

- Explain the various sizes and gauges of wire in accordance with American Wire Gauge Standards.
- Identify insulation and jacket types according to conditions and applications.
- Describe voltage ratings of conductors and cables.
- Read and identify markings on conductors and cables.
- Use the tables in NEC to determine the ampacity of a conductor.
- State the purpose of stranded wire.
- Describe the different materials from which conductors are made.
- Describe the different types of conductor insulation.
- Describe the color coding of insulation.
- Describe the procedure for pulling wire through conduit.
- Install conductors in conduit.
- Pull conductors in a conduit system.

**STRAND 10**

**Students will understand the application of boxes, fittings, and fixtures.**

**Standard 1**

Describe the different types of nonmetallic and metallic boxes.

**Standard 2**

Properly locate, install, and support boxes of all types.

**Standard 3**

Understand the NEC requirements for boxes supporting light fixtures.

**Standard 4**

Install the different types of fittings used in conjunction with boxes.

**Standard 5**

Explain how boxes and fittings are selected and installed.

**Standard 6**

Describe the various types of box supports.

**Performance Skills**

Understand the application of boxes, fittings, and fixtures.

- Describe the different types of nonmetallic and metallic boxes.
- Properly locate, install, and support boxes of all types.
- Understand the NEC requirements for boxes supporting light fixtures.
- Install the different types of fittings used in conjunction with boxes.
- Explain how boxes and fittings are selected and installed
- Describe the various types of box supports.