

## Course Title: Residential Wiring

<b>Unit 1:</b>	<b>Safety</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Demonstrate safety procedures as recognized by governing agencies and approved industry standards when testing and replacing components or installing wiring in residential applications.             <ul style="list-style-type: none"> <li>• Examples: Lockout, tagout</li> </ul> </li> <li>1. Identify electrical hazards and how to avoid and minimize them in the residential construction environment.</li> </ol>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Show proper safety procedures for working in the construction industry.</li> <li>2. Understand government regulations as applicable for new construction, or remodeling and equipment service.</li> <li>3. Understand proper procedures for installing and replacing electrical components.</li> <li>4. Identify electrical hazards in the construction environment.</li> </ol>
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<b>Essential Question(s):</b>	How does electricity affect our daily lives?
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
I. National Electric Code II. OSHA III. Personal Protection Equipment IV. Shop Safety Procedures	Lecture Demonstration Guest speaker Group assignment Individual assignment Research project	Textbook PowerPoint Computer/projector Service manual National Electric Code Worksheets

<b>Unit Assessment:</b>	Written test on electrical codes and shop safety test.
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<b>Unit/Course CTSO Activity:</b>	FFA Agricultural Mechanics CDE, Agricultural Mechanics Proficiency (SAE)
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**Unit/Course  
Culminating  
Product:**

Students will complete unit on wiring, shop, and construction site safety.

**Course/Program Credential(s):**  Credential  Certificate  Postsecondary Degree  University Degree  
 Other:

**Course Title: Residential Wiring**

<b>Unit 2:</b>	<b>Grounding</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>3. Explain the purpose of grounding systems in residential wiring applications.</li> <li>4. Distinguish between ground faults and short circuits in residential wiring applications.</li> <li>5. Describe the difference between system grounding and equipment grounding related to residential wiring.</li> <li>6. Demonstrate the installation of various grounding devices related to residential wiring.</li> </ol>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Explain and distinguish between various types of grounding systems.</li> <li>2. Identify and fix ground faults and short circuits in wiring systems.</li> <li>3. Install and troubleshoot electrical system grounding equipment.</li> <li>4. Identify grounding devices.</li> <li>5. Demonstrate proper procedures for installing grounding devices.</li> </ol>
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<b>Essential Question(s):</b>	Why does proper grounding protect your home and you?
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
I. Ground purpose II. Applications III. Systems IV. Components V. Installation	Lecture Demonstration Student practice Guest speaker Group assignment Individual assignment	Textbook PowerPoint Computer/projector Worksheets National Electric Code

<b>Unit Assessment:</b>	Written test and installation of grounding equipment activity.
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<b>Unit/Course CTSO Activity:</b>	Participation in Agricultural Mechanics CDE.
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**Unit/Course  
Culminating  
Product:**

Students will gain an insight into electrical current and how grounding is a necessary step in the wiring process.

**Course/Program Credential(s):**  Credential  Certificate  Postsecondary Degree  University Degree  
 Other:

**Course Title: Residential Wiring**

<b>Unit 3:</b>	<b>Conduit and Electrical Metallic Tubing Bending</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <p>7. Demonstrate the process of conduit bending according to specifications using hand and power equipment.</p> <ul style="list-style-type: none"> <li>• Computing angles for conduit bends and offsets</li> <li>• Demonstrating procedures for correcting and modifying existing conduit and electrical metallic tubing (EMT) bends.</li> </ul>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Identify applications for metallic conduit.</li> <li>2. Demonstrate procedures for bending metallic conduit in wiring applications.</li> </ol>
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<b>Essential Question(s):</b>	What is the benefit of putting wiring inside of metallic conduit?
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
I. Tools for bending and installing metallic conduit II. Installation procedures III. Determine correct angles for bending conduit.	Lecture Demonstration Student practice Guest speaker Group assignment Individual assignments	Textbook PowerPoint Computer/projector National Electrical Code Worksheets

<b>Unit Assessment:</b>	Correctly bend and install metallic conduit.
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<b>Unit/Course CTSO Activity:</b>	FFA Agricultural Mechanics CDE, Agricultural Mechanics Proficiency (SAE)
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**Unit/Course  
Culminating  
Product:**

Students will successfully lay out conduit and prepare it for a wiring installation.

**Course/Program Credential(s):**  Credential  Certificate  Postsecondary Degree  University Degree  
 Other:

**Course Title: Residential Wiring**

<b>Unit 4:</b>	<b>Boxes and Fittings</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <p>8. Calculate type and size of electrical boxes based on application, number, and size of conductors using the NEC codebook.</p> <ul style="list-style-type: none"> <li>• Demonstrating the ability to locate and install electrical boxes according to the NEC codebook</li> <li>• Explaining the NEC requirements for supporting lighting fixtures</li> <li>• Demonstrating the ability to install lighting fixtures according to specifications</li> </ul>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Determine what types of electrical boxes must be installed for various electrical projects.</li> <li>2. Determine what electrical codes must be followed when installing electrical light fixtures.</li> <li>3. Successfully install boxes and light fixtures according to code.</li> </ol>
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<b>Essential Question(s):</b>	Why is it important to follow code for installing electrical boxes?
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
I. Application of boxes II. Types of boxes and fixtures III. Electrical codes for boxes and lights IV. Installation techniques and procedures	Lecture Demonstration Student practice Guest speaker Group assignment Individual assignments	Textbook PowerPoint Computer/projector National Electrical Code Worksheets

<b>Unit Assessment:</b>	Hands-on demonstration of how to correctly install electrical boxes, switches, and light fixtures.
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<b>Unit/Course CTSO Activity:</b>	FFA Agricultural Mechanics CDE, Agricultural Mechanics Proficiency (SAE)
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**Unit/Course  
Culminating  
Product:**

Students will correctly install electrical boxes, switches, and light fixtures.

**Course/Program Credential(s):**  Credential  Certificate  Postsecondary Degree  University Degree  
 Other:

**Course Title: Residential Wiring**

<b>Unit 5:</b>	<b>Conductor Installation</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>9. Select the correct size and type of conductors for residential wiring applications and NEC code.</li> <li>10. Demonstrate different methods for installing common conductors used in residential wiring.</li> </ol>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Select materials for wiring applications based on needs.</li> <li>2. Successfully install wiring conductors in a circuit.</li> </ol>
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<b>Essential Question(s):</b>	What are the reasons conductors must be properly sized?
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
I. Resistance II. Conductor III. Insulator IV. Amps V. Volts VI. Watts VII. Ohm VIII. Wire sizes IX. Types of wire (single strand/multi-strand/braided) X. Installation procedures	Lecture Demonstration Student practice Guest speaker Group assignment Individual assignments	Textbook PowerPoint Computer/projector National Electrical code Worksheets

<b>Unit Assessment:</b>	Written test, assignment on correctly sizing wire
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**Unit/Course  
CTSO Activity:**

FFA Agricultural Mechanics CDE, Agricultural Mechanics Proficiency (SAE)

**Unit/Course  
Culminating  
Product:**

Shop project where students correctly select and install circuits with the correct size wire.

**Course/Program Credential(s):**  Credential  Certificate  Postsecondary Degree  University Degree  
 Other:

**Course Title: Residential Wiring**

<b>Unit 6:</b>	<b>Conductor Termination and Splices</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>11. Produce quality conductor terminations.</li> <li>12. Demonstrate the procedure for installing lugs and connectors onto conductors.</li> <li>13. Explain the importance of using correct bolt torque when working with busbars.</li> <li>14. Demonstrate correct conductor splicing and crimping.</li> </ol>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Make conductor terminations.</li> <li>2. Understand importance of correctly installing lugs into conductors.</li> <li>3. Understand and demonstrate correct procedures for installing lugs into electrical panel and onto busbars.</li> <li>4. Make connections using butt splices and wire nuts.</li> </ol>
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<b>Essential Question(s):</b>	<p>How do you produce quality conductor terminations?          How do you properly splice and crimp conductors?</p>
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
<ol style="list-style-type: none"> <li>I. Types of conductors</li> <li>II. Types of terminations</li> <li>III. Electrical panels and busbars</li> <li>IV Wire nuts, and connectors</li> <li>V. Wire stripping procedures</li> </ol>	<p>Lecture            Demonstration            Student practice            Guest speaker            Group assignment            Individual assignments</p>	<p>Textbook            PowerPoint            Computer/projector            National Electrical code            Worksheets</p>

<b>Unit Assessment:</b>	Demonstration of how to correctly make a wire splice and terminal connection.
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<b>Unit/Course CTSO Activity:</b>	FFA Agricultural Mechanics CDE, Agricultural Mechanics Proficiency (SAE)
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**Unit/Course  
Culminating  
Product:**

Students will complete a shop demonstration on how to correctly make a wire splice and terminal connection.

**Course/Program Credential(s):**  Credential  Certificate  Postsecondary Degree  University Degree  
 Other:

**Course Title: Residential Wiring**

<b>Unit 7:</b>	<b>Installation of Electrical Services</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <p>15. Install main disconnects, switches, panel boards, and over-current protection.</p> <ul style="list-style-type: none"> <li>• Describing various types of residential electrical service installations</li> <li>• Calculate circuit loads for installation of electrical services</li> </ul>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Install electrical service panels.</li> <li>2. Install meter base.</li> <li>3. Install entrance head.</li> <li>4. Calculate amperage and voltage requirements.</li> </ol>
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<b>Essential Question(s):</b>	How do you correctly install main disconnects, switches, panel boards, and over-current protection?
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
I. Residential service panel sizes (200-400 amp) II. Service wire size III. Weather head IV. Conduit V. Meter base VI. Clamps VII. Grounding cable VIII. Grounding rod IX. Entrance height	Lecture Demonstration Student practice Guest speaker Group assignment Individual assignments	Textbook PowerPoint Computer/projector National Electrical code Worksheets

<b>Unit Assessment:</b>	Performance by students installing a meter base, service panel and entrance head.
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<b>Unit/Course CTSO Activity:</b>	FFA Agricultural Mechanics CDE, Agricultural Mechanics Proficiency (SAE)
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<b>Unit/Course Culminating Product:</b>	Students will install a meter base, service panel, and entrance head for a structure.
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<b>Course/Program Credential(s):</b> <input type="checkbox"/> Credential <input type="checkbox"/> Certificate <input checked="" type="checkbox"/> Postsecondary Degree <input type="checkbox"/> University Degree <input type="checkbox"/> Other:
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**Course Title: Residential Wiring**

<b>Unit 8:</b>	<b>Circuit Breakers and Fuses</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>16. Identify devices used for over-current protection.</li> <li>17. Describe the operation of circuit breakers and fuses.</li> </ol>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Identify sizes and types of breakers and fuses.</li> <li>2. Correctly install breakers and fuses into breaker panel or fuse panels.</li> </ol>
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<b>Essential Question(s):</b>	Why is it important to have the correct size breaker or fuses?
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
<ol style="list-style-type: none"> <li>I. Types of breakers</li> <li>II. Types of fuses</li> <li>III. Sizes of breakers</li> <li>IV. Sizes of fuses</li> <li>V. Purpose of breakers and fuses</li> </ol>	<p>Lecture                      Demonstration                      Student practice                      Guest speaker                      Group assignment                      Individual assignments</p>	<p>Textbook                      PowerPoint                      Computer/projector                      National Electrical Code                      Worksheets</p>

<b>Unit Assessment:</b>	Demonstrate the ability to install breakers or fuses according to load applications.
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<b>Unit/Course CTSO Activity:</b>	FFA Agricultural Mechanics CDE, Agricultural Mechanics Proficiency
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**Unit/Course  
Culminating  
Product:**

Students will demonstrate a proficiency in wiring techniques.

**Course/Program Credential(s):**  Credential  Certificate  Postsecondary Degree  University Degree  
 Other:

## Course Title: Residential Wiring

<b>Unit 9:</b>	<b>Residential Wiring Systems</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <p>18. Use a specific plan to complete a wiring project for residential applications.</p>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Understand electrical terms and symbols.</li> <li>2. Wire simple circuits             <ul style="list-style-type: none"> <li>• Plugs</li> <li>• Lights</li> <li>• Switches</li> <li>• Breakers</li> </ul> </li> </ol>
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<b>Essential Question(s):</b>	
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Content Knowledge	Suggested Instructional Activities Rigor & Relevance Framework (Quadrant)	Suggested Materials, Equipment and Technology Resources
I. Electrical terms and symbols II. Print reading III. Electrical tools and supplies IV. Electric code	Lecture Demonstration Student practice Guest speaker Group assignment Individual assignments	Textbook PowerPoint Computer/projector National Electrical code Worksheets

<b>Unit Assessment:</b>	Written test, worksheet, observation, directed shop work
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<b>Unit/Course CTSO Activity:</b>	FFA Agricultural Mechanics CDE, Agricultural Mechanics Proficiency (SAE)
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**Unit/Course  
Culminating  
Product:**

Students will complete a wiring project typical of a residential application.

**Course/Program Credential(s):**  Credential  Certificate  Postsecondary Degree  University Degree  
 Other: