



Scope and Sequence Curriculum Outline

Career Program: Electricity I

DOE Code: 4830

Career Cluster: Architecture and Construction

Recommended Grade Levels: 11, 12

Prerequisites: None

High School Credits: 3 per semester (6 total per school year)

Additional Information: Counts as a Directed Elective or Elective for the General, Core 40, Academic Honors and Technical Honors diplomas

Program Description: Electricity I includes classroom and laboratory experiences focused on the installation and repair of the electrical and wiring systems of physical structures. This program includes instruction on the reading of technical drawings and their application in construction processes. Topics include the relationship between views and details, interpretation of dimension, transposing scale, tolerance, electrical symbols, sections, material lists, architectural plans, room schedules, and plot plans. Mathematical principles are used to solve electrical problems, including both AC and DC circuits. Students learn about electron theory, Ohm's Law, Watt's Law, Kirchoff's Law, series circuits, series-parallel circuits, electromagnetic induction, current, voltage, resistance, power, inductance, capacitance, and transformers and apply what they have learned to projects in the classroom and in the field. Many projects are completed in teams working with Construction Technology students.

Alignment: Indiana Department of Education Academic Standards Course Framework; National Center for Construction Education and Research (NCCER) Core Curriculum; NCCER Electrical I Curriculum; Ivy Tech Community College (dual credit agreement); NCCER textbook materials.

Companion Documents: WCC Electricity I Program Syllabus; WCC High School Pathway Plan; WCC Program Description Guide

Curriculum Content Summary:

- Introduction to the Construction Industry
- Construction Blueprint Reading
- Electrical Basics
- Basic Employability / Orientation to the Trade

Content	Indiana DOE Standards	Knowledge & Skills <i>(Based on NCCER)</i>	Example Activities	Time Frame	Evaluation / Certification
<p>DOMAIN Introduction To Construction Technology</p> <p>Core Standard I Students examine concepts of basic shop safety and proper tool usage to ensure compliance with professional and governmental regulations</p>	<p>ETI-1.1 Demonstrate safe practices and procedures with construction tools</p> <p>ETI-1.2 Demonstrate basic shop and workplace safety procedures</p> <p>ETI-1.3 Properly use basic construction hand tools</p> <p>ETI-1.4 Use levels and transits</p> <p>ETI-1.5 Demonstrate the proper use of portable power tools</p> <p>ETI-1.6 Demonstrate the proper set-up and use of stationary power tools</p> <p>ETI-1.7 Interpret plans, specifications and codes</p> <p>ETI-1.8 Select appropriate tools to create a lab project built to plans or specifications</p> <p>ETI-1.9 Diagnose technical and wiring problems based on given information</p> <p>ETI-1.10 Interpret health, safety, and welfare standards as dictated by local, state or federal agencies</p>	<p>NCCER Core – Module 1</p> <ul style="list-style-type: none"> Describe the importance of safety, the causes of workplace incidents, and the process of hazard recognition and control Describe the safe work requirements for elevated work, including fall protection guidelines Identify and explain how to avoid stuck-by and caught-in-between hazards Identify common energy-related hazards and explain how to avoid them Identify and describe the proper use of personal protective equipment Identify and describe other specific job-site safety hazards Properly set up and climb/descend and extension ladder, demonstrating proper three-point contact Inspect PPE items and determine if they are safe to use Properly don, fit, and remove PPE items Inspect a typical power cord and GFCI to ensure their serviceability <p>NCCER Core – Module 3</p> <ul style="list-style-type: none"> Identify and explain how to use various types of hand tools Identify and explain how to use various types of measurement and layout tools Identify and explain how to use various types of cutting and shaping tools Identify and explain how to use other common hand tools Visually inspect hand tools to determine if they are safe to use Safely and properly use hand tools Make a straight, square cut in framing lumber using a crosscut saw <p>NCCER Core – Module 4</p> <ul style="list-style-type: none"> Identify and explain how to use various types of power drills and impact wrenches Identify and explain how to use various types of power saws Identify and explain how to use various grinders and grinder attachments Identify and explain how to use miscellaneous power tools Safely and properly demonstrate the use of power tools 	<ul style="list-style-type: none"> Safety videos and demonstrations Safety walk and talk around the campus Lab activities <ul style="list-style-type: none"> Hand tool safety videos Lab activities <ul style="list-style-type: none"> Power tool safety videos. Lab activities 	<p>17 weeks</p> <p>Reinforced throughout the year</p>	<ul style="list-style-type: none"> NCCER Core Curriculum Modules 1, 3, 4, 6, and 9 Written and Performance Assessments NCCER Construction Site Safety Orientation Credential NCCER Electrical I Module 2 Written and Performance Assessments OSHA 10-Hour Certification Dual credit Weekly participation Classroom work

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<p>DOMAIN Introduction To Construction Technology</p> <p>Core Standard I Students examine concepts of basic shop safety and proper tool usage to ensure compliance with professional and governmental regulations</p> <p style="text-align: center;"><i>-Continued-</i></p>		<p>NCCER Core – Module 6</p> <ul style="list-style-type: none"> • Identify and describe various types of rigging slings, hardware, and equipment • Demonstrate the proper ASME Emergency Stop hand signal <p>NCCER Core – Module 9</p> <ul style="list-style-type: none"> • Describe the basic concepts of material handling and common safety precautions • Identify various types of material handling equipment and describe how they are used • Demonstrate safe manual lifting techniques • Demonstrate how to tie common knots <p>NCCER Electrical I – Module 2</p> <ul style="list-style-type: none"> • Recognize safe working practices in the 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 electrical safety issues concerning lockout/tagout procedures, confined space entry, respiratory protection, and fall protection systems • 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 • Perform a visual inspection on various types of ladders • Set up a ladder properly to perform a task • Properly don a harness • Perform a hazard assessment of a job • 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 • Plan an escape route from the location in the event of an accident 	<ul style="list-style-type: none"> • Lab activities • Training videos • Lab activities • OSHA 10 hour safety certification • Training videos • Lab activities 		

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<p>DOMAIN Construction Blueprint Reading</p> <p>Core Standard 2 Students interpret data from plans, blueprints, and codes to ensure structures are built to specifications</p>	<p>ETI-2.1 Identify various elements used in commercial and residential blueprints</p> <p>ETI-2.2 Identify the types of architectural lines, symbols, notations, and abbreviations used in print reading</p> <p>ETI-2.3 Distinguish between types of drawings such as elevation views, section views, detail views, and construction materials</p> <p>ETI-2.4 Interpret and explain building specifications</p> <p>ETI-2.5 Define dimensioning standards</p> <p>ETI-2.6 Demonstrate the ability to read various scales used in print reading</p> <p>ETI-2.7 Read blueprints for structural and trade information</p> <p>ETI-2.8 Demonstrate knowledge and skills in reading various plot plans</p> <p>ETI-2.9 Think critically to evaluate technical problems and information</p>	<p>NCCER Core – Module 5</p> <ul style="list-style-type: none"> Identify various types of construction drawings Identify and describe the purpose of the five basic construction drawing components Identify and explain the significance of various drawing elements, such as lines of construction, symbols, and grid lines Identify and explain the use of dimensions and various drawing scales Identify and describe how to use engineer’s and architect’s scales Using a floor plan, locate elements of the structure, including walls, dimensions, and elevation <p>NCCER Electrical 1 – Module 10</p> <ul style="list-style-type: none"> Explain the basic layout of a set of construction drawings Describe the information included in the title block of a construction drawing Identify the types of lines used on construction drawings Using an architect’s scale, state the actual dimensions of a given drawing component Interpret electrical drawings, including site plans, floor plans, and detail drawings Interpret equipment schedules found on electrical drawings Describe the type of information included in electrical specifications Using an architect’s scale, state the actual dimensions of a given drawing component Make a materials takeoff of the lighting fixtures specified 	<ul style="list-style-type: none"> Lab activities Oldenburg Town Hall blueprint discussion and activities <ul style="list-style-type: none"> Lab activities Oldenburg Town Hall blueprint discussion and activities 	<p>5 weeks</p> <p>Reinforced throughout the year</p>	<ul style="list-style-type: none"> NCCER Core Curriculum Module 5 Written and Performance Assessments NCCER Electrical I Module 10 Written and Performance Assessments Dual credit Weekly participation Classroom work

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<p>DOMAIN Electrical Basics</p> <p>Core Standard 3 Students apply concepts of circuitry to ensure proper wiring of structure</p>	<p>ETI-3.1 Describe the differences in AC and DC current</p> <p>ETI-3.2 Explain the operation of capacitors, inductors, and transformers</p> <p>ETI-3.3 Identify various power sources</p>	<p>NCCER Electrical 1 – Module 3</p> <ul style="list-style-type: none"> 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 Identify the meters used to measure voltage, current, and resistance Explain the basic characteristics of series and parallel circuits 	<ul style="list-style-type: none"> In-depth study of Ohm’s Law 	<p>2 weeks</p> <p>Reinforced throughout the year</p>	<ul style="list-style-type: none"> NCCER Electrical I Module 3 Written and Performance Assessments Dual credit Weekly participation Classroom work

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<p>DOMAIN Electrical Basics</p> <p>Core Standard 4 Students design electrical circuits to ensure correct wiring operations in structures</p>	<p>ETI-4.1 Draw a simple DC circuit and explain various components</p> <p>ETI-4.2 Describe the properties of resistance, voltage, current and power</p> <p>ETI-4.3 Use Ohm’s Law to calculate values</p> <p>ETI-4.4 Use a multimeter to measure values in a circuit</p> <p>ETI-4.5 Draw and explain series, parallel, series-parallel, open and short circuits</p> <p>ETI-4.6 Explain the properties of magnetism and electro-magnetism</p> <p>ETI-4.7 Describe the operation of capacitors, inductors, and transformers</p> <p>ETI-4.8 Solve mathematical problems relating to electrical systems</p>	<p>NCCER Core – Module 2</p> <ul style="list-style-type: none"> Identify whole numbers and demonstrate how to work with them mathematically Explain how to work with fractions Describe the decimal system and explain how to work with decimals Identify various tools used to measure length and show how they are used Identify and convert units of length, weight, volume, and temperature between the imperial and metric systems of measurement Identify basic angles and geometric shapes and explain how to calculate their area and volume <p>NCCER Electrical 1 – Module 4</p> <ul style="list-style-type: none"> Explain the basic characteristics of combination circuits Calculate, using Kirchhoff’s voltage law, the voltage drop in series, parallel, and series-parallel circuits Calculate, using Kirchhoff’s current law, the total current in parallel and series-parallel circuits Using Ohm’s law, find the unknown parameters in series, parallel, and series-parallel circuits 	<ul style="list-style-type: none"> Basic Mathematics for Electricity units In-depth study of Ohm’s Law 	<p>5 weeks</p> <p>Reinforced throughout the year</p>	<ul style="list-style-type: none"> NCCER Core Curriculum Module 2 Written and Performance Assessments NCCER Electrical I Module 4 Written and Performance Assessments Dual credit Weekly participation Classroom work

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<p>DOMAIN Electrical Basics</p> <p>Core Standard 5 Students apply appropriate procedures when working with electricity to ensure compliance with professional and governmental regulations</p>	<p>ETI-5-1 Explain proper fusing and wire sizing</p> <p>ETI-5-2 Explain proper safety practices when working with electricity</p> <p>ETI-5-3 Think critically to evaluate technical problems and information</p>	<p>NCCER Electrical 1 – Module 5</p> <ul style="list-style-type: none"> • Explain the purpose and history of the NEC® • Describe the layout of the NEC® • Demonstrate how to navigate the NEC® • Describe the purpose of the National Electrical Manufacturers Association and the NFPA • Explain the role of nationally recognized testing laboratories • Use NEC Article 90 to determine the scope of the NEC® • Find the definition of the term feeder in the NEC® • Look up the NEC® specifications that you would need to follow if you were installing an outlet near a swimming pool • 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 	<ul style="list-style-type: none"> • In-depth study of the current National Electric Code 	<p>2 weeks</p> <p>Reinforced throughout the year</p>	<ul style="list-style-type: none"> • NCCER Electrical I Module 5 Written and Performance Assessments • Dual credit • Weekly participation • Classroom work

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<p>DOMAIN Basic Employability / Orientation to the Trade</p> <p>Students apply employability skills and understand the construction / electrical trades in order to gain employment</p>	<p>No corresponding standards</p>	<p>NCCER Core – Module 8</p> <ul style="list-style-type: none"> Describe the opportunities in the construction business and how to enter the construction workforce Explain the importance of critical thinking and how to solve problems Explain the importance of social skills and identify ways good social skills are applied in the construction trade <p>NCCER Core – Module 7</p> <ul style="list-style-type: none"> Describe the communication, listening, and speaking processes and their relationship to job performance Describe good reading and writing skills and their relationship to job performance Perform a given task after listening to oral instructions Fill out a work-related form Read and interpret a set of instructions for properly performing a task, and orally instruct another person to perform the task <p>NCCER Electrical 1 – Module 1</p> <ul style="list-style-type: none"> Describe the apprenticeship/training process for electricians Describe various career paths/opportunities one might follow in the electrical trade Define the various sectors of the electrical industry State the tasks typically performed by an electrician Explain the responsibilities and aptitudes of an electrician 	<ul style="list-style-type: none"> Construction Career Field Day Mock interviews Resume writing Job searches in the computer lab Apprenticeship training worksheets and essay Student ambassadors SkillsUSA membership Skills competitions NTHS Guest speakers 	<p>5 weeks</p> <p>Reinforced throughout the year</p>	<ul style="list-style-type: none"> NCCER Core Curriculum Modules 7, 8 Written and Performance Assessments NCCER Electrical I Module 1 Written and Performance Assessments Essential Skills Evaluation Technical Skills Evaluation Work Ethic Certification Weekly participation Classroom work