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**PROGRAM CONCENTRATION:**

**Architecture, Construction,  
Communications & Transportation**

**CAREER PATHWAY:**

**CLIMATE CONTROL SYSTEMS TECHNOLOGY**

**COURSE TITLE:**

**Low Voltage Electrical II**

This course is preceded by Low Voltage Electrical I. The course is the third of three courses that provides the trainee a solid foundation in electrical skills and knowledge. It is the final step in gaining a Level One Industry Certification in Electrical.

This course focuses on proper selection, inspection, use, and maintenance of common electrical test equipment; introduces the types and applications of raceways, wire-ways, and ducts; focuses on the types and application of conductors and cover proper wiring techniques, electrical prints, drawings and symbols; covers the electrical devices and wiring techniques common to commercial and industrial construction, HVACR and maintenance, and covers the electrical devices and wiring techniques common to residential construction and maintenance.

**ACCT -LVE2-1 Students will understand and explain the importance of the current National Electrical Code (NEC), National Electrical Manufacturers Association Code (NEMA), National Fire Protection Association Code (NFPA), and Underwriters Laboratories (UL) Standards.**

- a. Demonstrate knowledge of the use of electrical codes and specifications.
- b. Demonstrate ability to apply codes to calculating loads.
- c. Recognize and apply code, specification and load knowledge to HVACR installation.

**Academic Standards:**

*SSCG15. The student will explain the functions of the departments and agencies of the federal bureaucracy.*

- a. *Compare and contrast the organization and responsibilities of independent regulatory agencies, government corporations, and executive agencies.*

*SSCG18. The student will demonstrate knowledge of the powers of Georgia's state and local governments.*

- a. *Examine the powers of state and local government.*
- b. *Examine sources of revenue received by each level of government.*
- c. *Analyze the services provided by state and local government.*

*ELA9RL5. The student understands and acquires new vocabulary and uses it correctly in reading and writing.*

- a. *Identifies and correctly uses idioms, cognates, words with literal and*

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*figurative meanings, and patterns of word changes that indicate different meanings or functions.*

- b. Uses knowledge of Greek and Latin prefixes, suffixes, and roots to understand the meanings of new words.*
- c. Uses general dictionaries, specialized dictionaries, thesauruses, or related references as needed to increase learning.*

*ELA9W3 The student uses research and technology to support writing. The student*

- a. Formulates clear research questions and utilizes appropriate research venues (e.g., library, electronic media, personal interview, survey) to locate and incorporate evidence from primary and secondary sources.*
- b. Uses supporting evidence from multiple sources to develop the main ideas within the body of an essay, composition, or technical document.*

**ACCT -LVE2-2 Students will investigate the identification and installation of conductors according to NEC.**

- a. Demonstrate the knowledge of NEC as related to conductors.
- b. Demonstrate knowledge of selecting proper conductors for a specified application.
- c. Demonstrate knowledge of proper installation of selected conductors.

**Academic Standards:**

**SSCG15.** *The student will explain the functions of the departments and agencies of the federal bureaucracy.*

- a. Compare and contrast the organization and responsibilities of independent regulatory agencies, government corporations, and executive agencies.*

**SSCG18.** *The student will demonstrate knowledge of the powers of Georgia's state and local governments.*

- a. Examine the powers of state and local government.*
- b. Examine sources of revenue received by each level of government.*
- c. Analyze the services provided by state and local government.*

**SP5** *Students will evaluate relationships between electrical and magnetic forces.*

- a. Describe the transformation of mechanical energy into electrical energy and the transmission of electrical energy.*
- b. Determine the relationship among potential difference, current, and resistance in a direct current circuit.*
- c. Determine equivalent resistances in series and parallel circuits.*
- d. Determine the relationship between moving electric charges and magnetic*

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*fields.*

**ACCT -LVE2-3 Students demonstrate the ability to install a variety of fixtures.**

- a. Demonstrates knowledge of the selection of the proper fixture for the specified application.
- b. Demonstrate knowledge of the installation of various fixtures.
- c. Demonstrate knowledge of HVACR equipment tie in to electrical systems.

**Academic Standards:**

*SSCG18. The student will demonstrate knowledge of the powers of Georgia's state and local governments.*

- a. Examine the powers of state and local government.*
- b. Examine sources of revenue received by each level of government.*
- c. Analyze the services provided by state and local government.*

*MM1P1. Students will solve problems (using appropriate technology)*

- a. Build new mathematical knowledge through problem solving.*
- b. Solve problems that arise in mathematics and in other contexts.*
- c. Apply and adapt a variety of appropriate strategies to solve problems.*
- d. Monitor and reflect on the process of mathematical problem solving.*

*SCSh4 Students will use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.*

- a. Develop and use systematic procedures for recording and organizing information.*

*SCSh5 Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations*

- a. Trace the source on any large disparity between estimated and calculated answers to problems.*
- b. Consider possible effects of measurement errors on calculations.*

**ACCT -LVE2-4 Students will explore voltage, resistance, current and how they relate.**

- a. Demonstrate a working knowledge of Ohm's Law, Kirchhoff's Law and how they work in a circuit.
- b. Demonstrate the knowledge of the math needed to calculate voltage, wattage, amps and resistance.
- c. Demonstrate application of this knowledge in connecting HVACR equipment.

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**Academic Standards:**

*MM1P1. Students will solve problems (using appropriate technology).*

- a. Build new mathematical knowledge through problem solving.*
- b. Solve problems that arise in mathematics and in other contexts.*
- c. Apply and adapt a variety of appropriate strategies to solve problems.*
- d. Monitor and reflect on the process of mathematical problem solving.*

*MM2A2. Students will explore exponential functions.*

- d. Solve simple exponential equations and inequalities analytically, graphically, and by using appropriate technology.*
- e. Understand and use basic exponential functions as models of real phenomena.*

*SCSh4 Students will use tools and instruments for observing, measuring, and manipulating scientific equipment and materials*

- a. Develop and use systematic procedures for recording and organizing information*

*SPS1 Students will investigate our current understanding of the atom.*

- a. Examine the structure of the atom in terms of
  - *proton, electron, and neutron locations.*
  - *atomic mass and atomic number.*
  - *atoms with different numbers of neutrons (isotopes).*
  - *explain the relationship of the proton number to the element's identity.**

*SP5 Students will evaluate relationships between electrical and magnetic forces.*

- a. Describe the transformation of mechanical energy into electrical energy and the transmission of electrical energy.*
- b. Determine the relationship among potential difference, current, and resistance in a direct current circuit.*
- c. Determine equivalent resistances in series and parallel circuits.*
- d. Determine the relationship between moving electric charges and magnetic fields.*

*ELAALRC3 The student acquires new vocabulary in each content area and uses it correctly.*

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- a. *Demonstrates an understanding of contextual vocabulary in various subjects.*
- b. *Uses content vocabulary in writing and speaking.*
- c. *Explores understanding of new words found in subject area texts.*

## Reading Across the Curriculum

### Reading Standard Comment

After the elementary years, students engage in reading for learning. This process sweeps across all disciplinary domains, extending even to the area of personal they experience text in all genres and modes of discourse. In the study of various disciplines of learning (language arts, mathematics, science, social studies), students must learn through reading the communities of discourse of each of those disciplines. Each subject has its own specific vocabulary, and for students to excel in all subjects, they must learn the specific vocabulary of those subject areas in context.

Beginning with the middle grades years, students begin to self-select reading materials based on personal interests established through classroom learning. Students become curious about science, mathematics, history, and literature as they form contexts for those subjects related to their personal and classroom experiences. As students explore academic areas through reading, they develop favorite subjects and become confident in their verbal discourse about those subjects.

Reading across curriculum content develops both academic and personal interests in students. As students read, they develop both content and contextual vocabulary. They also build good habits for reading, researching, and learning. The Reading Across the Curriculum standard focuses on the academic and personal skills students acquire as they read in all areas of learning.

Students will enhance reading in all curriculum areas by:

- a. Reading in all curriculum areas
  - Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas.
  - Read both informational and fictional texts in a variety of genres and modes of discourse.
  - Read technical texts related to various subject areas.
- b. Discussing books
  - Discuss messages and themes from books in all subject areas.
  - Respond to a variety of texts in multiple modes of discourse.
  - Relate messages and themes from one subject area to messages and themes in another area.
  - Evaluate the merit of texts in every subject discipline.
  - Examine author's purpose in writing.
  - Recognize the features of disciplinary texts.
- c. Building vocabulary knowledge

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- Demonstrate an understanding of contextual vocabulary in various subjects.
  - Use content vocabulary in writing and speaking.
  - Explore understanding of new words found in subject area texts.
- d. Establishing context
- Explore life experiences related to subject area content.
  - Discuss in both writing and speaking how certain words are subject area related.
  - Determine strategies for finding content and contextual meaning for unknown words.

#### FOUNDATION SKILLS

**CTAE-FS-1 Technical Skills:** Learners achieve technical content skills necessary to pursue the full range of careers for all pathways in the program concentration.

**CTAE-FS-2 Academic Foundations:** *Learners achieve state academic standards at or above grade level.*

**CTAE-FS-3 Communications:** Learners use various communication skills in expressing and interpreting information.

**CTAE-FS-4 Problem Solving and Critical Thinking:** Learners define and solve problems, and use problem-solving and improvement methods and tools.

**CTAE-FS-5 Information Technology Applications:** Learners use multiple information technology devices to access, organize, process, transmit, and communicate information.

**CTAE-FS-6 Systems:** Learners understand a variety of organizational structures and functions.

**CTAE-FS-7 Safety, Health and Environment:** *Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.*

**CTAE-FS-8 Leadership and Teamwork:** Learners apply leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.

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**CTAE-FS-9 Ethics and Legal Responsibilities:** Learners commit to work ethics, behavior, and legal responsibilities in the workplace.

*CTAE-FS-10 Career Development: Learners plan and manage academic-career plans and employment relations.*

**CTAE-FS-11 Entrepreneurship:** Learners demonstrate understanding of concepts, processes, and behaviors associated with successful entrepreneurial performance.