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PROGRAM CONCENTRATION:

**Architecture, Construction,
Communications & Transportation**

CAREER PATHWAY:

CLIMATE CONTROL SYSTEMS TECHNOLOGY

COURSE TITLE:

Low Voltage Electrical I

This course is preceded by Introduction to Mechanical Systems. The course is the second of three courses that provides the trainee a solid foundation in electrical skills and knowledge and how they integrate with the HVACR systems. It is the second step in gaining a Level One Industry Certification in Electrical.

This course builds on the concepts of electrical safety introduced in Occupational Safety. It provides knowledge of the hardware and systems used by an HVACR technician/electrician and the basic skills to install them. It provides a general knowledge of electrical systems including series, parallel, and series-parallel circuits. It also shows the integration between the electrical and HVACR fields. It provides the basic skills and knowledge to navigate and use the National Electrical Code. It provides an introduction to the skills and knowledge of conduit bending and installation.

ACCT -LVE1-1 Students will demonstrate an understanding of, and apply general construction and specific OSHA and EPA safety concepts and practices.

- a. Demonstrate safe working procedures in the electrical/electronic environment.
- b. Identify electrical hazards and how to minimize them in the workplace.
- c. Explain safety issue concerning lockout, tag out, PPE, assured grounding and isolation programs, confined spaces, breathing and fall protection.

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.*
- b. *Explain the functions of the Cabinet.*

SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.

- a. *Follow correct procedures for use of scientific apparatus.*
- b. *Demonstrate appropriate techniques in all laboratory situations.*
- c. *Follow correct protocol for identifying and reporting safety problems and violations.*

SSEPF5. The student will describe how insurance and other risk-management

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strategies protect against financial loss.

- a. *List various types of insurance such as automobile, health, life, disability and property.*
- b. *Explain the costs and benefits associated with different types of insurance.*

SSEF5. The student will describe the roles of government in a market economy.

- b. *Give examples of government regulation and deregulation and their effects on consumers and producers.*

ACCT -LVE1-2 Students will use tools, instruments, and equipment in a professional and safe manner.

- a. Demonstrate 90 degree bends, back-to-back bends, offsets, kicks, and saddle bends using a hand bender.
- b. Demonstrate correct application of fasteners and anchors.
- c. Demonstrate proper use of a multi-meter, clamp-on ammeter, and megohm-meter.
- d. Demonstrate the knowledge of testing GFCI.

Academic Standards:

MM1D1. Students will determine the number of outcomes related to a given event.

- a. *Apply the addition and multiplication principles of counting.*
- b. *Calculate and use simple permutations and combinations.*

MM1G1. Students will investigate properties of geometric figures in the coordinate plane.

- a. *Determine the distance between two points.*
- b. *Determine the distance between a point and a line.*
- c. *Determine the midpoint of a segment.*
- d. *Understand the distance formula as an application of the Pythagorean theorem.*

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.*

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

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

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MM1P4. Students will make connections among mathematical ideas and to other disciplines.

- a. Recognize and use connections among mathematical ideas.*
- b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.*
- c. Recognize and apply mathematics in contexts outside of mathematics.*

ACCT -LVE1-3 Students will demonstrate an understanding of the selection, handling, storage, and proper use of electrical/electronic materials.

- a. Recognize the correct fasteners and anchors.*
- b. Demonstrate knowledge of proper handling and storage of capacitors, motors, transformers and other electronic and electrical equipment.*
- c. Demonstrate proper handling of electronic circuitry.*

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

ACCT -LVE1-4 Students will read, interpret, apply information and estimate costs from a variety of architectural and construction working drawings.

- a. Read and interpret electrical blueprints.*

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- b. Read and interpret electrical diagrams.
- c. Estimate materials based on blueprints provided.

Academic Standards:

MM1D1. Students will determine the number of outcomes related to a given event.

- a. Apply the addition and multiplication principles of counting.*
- b. Calculate and use simple permutations and combinations.*

MM1G1. Students will investigate properties of geometric figures in the coordinate plane.

- a. Determine the distance between two points.*
- b. Determine the distance between a point and a line.*
- c. Determine the midpoint of a segment.*

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.*

MM1P3. Students will communicate mathematically.

- a. Organize and consolidate their mathematical thinking through communication.*
- b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.*
- c. Analyze and evaluate the mathematical thinking and strategies of others.*
- d. Use the language of mathematics to express mathematical ideas precisely.*

MM1P4. Students will make connections among mathematical ideas and to other disciplines.

- a. Recognize and use connections among mathematical ideas.*
- b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.*
- c. Recognize and apply mathematics in contexts outside of mathematics.*

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

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- 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.*

ACCT -LVE1-5 Students will demonstrate an understanding of electrical circuitry including raceways, boxes, and conduit.

- a. Recognize and accurately size electrical devices and boxes.
- b. Recognize and accurately size electrical conduit.
- c. Demonstrate knowledge of computing loads for various circuits.
- d. Demonstrate knowledge of connecting HVACR equipment to power supplies.

Academic Standards:

MM4P4. Students will make connections among mathematical ideas and to other disciplines.

- a. Recognize and use connections among mathematical ideas.*
- b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.*
- c. Recognize and apply mathematics in contexts outside of mathematics.*

MM1D1. Students will determine the number of outcomes related to a given event.

- a. Apply the addition and multiplication principles of counting.*
- b. Calculate and use simple permutations and combinations.*

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*

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.*

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

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.