



**Alabama
Department of
Postsecondary Education**

Representing the Alabama Community College System

STATEWIDE CAREER/TECHNICAL EDUCATION COURSE ARTICULATION REVIEW MINUTES

Articulation Agreement Identifier: ACR121 (2006-1) Identifier is the postsecondary course prefix followed by Plan-of-Instruction version number (e.g.; INT 100 (2007-1)).

Applicable CIP code(s): 15.0501; 47.0201

Postsecondary course prefix, number, and title: ACR 121/ASC 121 – Principles of Electricity for HVAC/R

Secondary Education course(s) title and number: 431804/430124 - Introduction to Electricity for Heating, Ventilation, Air-Conditioning, and Refrigeration Systems

Initial Review: October 13, 2009 Annual DPE Review: January 25, 2012

Effective dates: Fall Semester 2011.

Course Content Analysis (all postsecondary course objectives must be sufficiently addressed in the secondary courses):

Notes:

- 1 Skills and knowledge contained in the postsecondary course objectives must be present in the corresponding secondary objectives for a “match” to occur.**
- 2. Postsecondary and Secondary objectives must reflect similar content and performance levels before the course articulation agreement will be recommended to the TEDAC Oversight Committee.**
- 3. More than one Secondary course may be used in order to articulate to a Postsecondary course.**

Postsecondary Course Objectives	Secondary Courses and Objectives	TEDAC Comments
<p>MODULE A – PRINCIPLES OF ELECTRICITY</p> <p>Competency: A1.0 Explain basic concepts related to electricity.</p> <p>Performance Objective: None</p> <p>Learning Objectives: A1.1.1 Explain the use of personal protective equipment. A1.1.2 Explain hazards associated with electrical systems. A1.1.3 Explain lockout/tag out procedures. A1.1.4 Define electrical terms. A1.1.5 Explain the principles of atomic structure. A1.1.6 Explain the principles of electrons, protons, and neutrons. A1.1.7 Explain the principles of electron movement. A1.1.8 Explain the theory of Ohm’s Law. A1.1.9 Explain the components of an electric circuit. A1.1.10 Draw a basic electrical circuit.</p> <p>Competency: A2.0 Value the importance of following safety precautions.</p> <p>Performance Objective: None</p> <p>Learning Objectives: A2.1.1 State the importance of following safety procedures.</p>	<p>Introduction to Electricity for Heating, Ventilation, Air-Conditioning, and Refrigeration Systems</p> <p>Unit 1 – Safety</p> <p>Content Standard(s) 1. Demonstrate safety rules, regulations, and procedures when working with electrical systems.</p> <p>Learning Objective(s) 1. Explain hazards associated with specific types of equipment and tools. 2. State the importance of following safety precautions. 3. Explain the use of personal protective equipment. 4. Explain hazards associated with HVAC/R electrical circuits. 5. Explain lockout/tag out procedures.</p> <p>Unit 2 – Hand and Power Tools</p> <p>Content Standard(s) 2. Demonstrate use of hand tools and power tools related to HVACR systems.</p> <p>Learning Objective(s) 1. Obtain safe operation skills regarding tools and equipment. 2. Identify hand and power tool functions and applications. 3. Inspect and maintain tools and equipment for safe operation. 4. Accomplish safe hands-on use of tools and equipment. 5. Demonstrate the safe and appropriate use and maintenance of various portable power tools. 6. Demonstrate the safe and appropriate use and maintenance of various stationary power tools. 7. Demonstrate the safe and appropriate use and maintenance of various pneumatic power tools. 8. Demonstrate the safe and appropriate use and maintenance of various powder actuated power tools.</p>	

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<p>MODULE B – ELECTRICAL TEST INSTRUMENTS Competency: B1.0 Use electrical test instruments to test electrical circuits. Performance Objective: B1.1 Use various instruments to test an electrical circuit to determine if the readings are in accordance with specifications. Learning Objectives: B1.1.1 Explain the operational characteristics and use of various types of electrical test instruments. B1.1.2 Describe considerations for using electrical test instruments. Competency: B2.0 Value the importance of using electrical testing instruments properly and safely. Performance Objective: None Learning Objectives: B2.1.1 State the importance of following safety precautions when using electrical testing equipment. B2.1.2 State the importance of using electrical test equipment safely.</p>	<p>Unit 3 – Test Equipment Content Standard(s) 3. Use various meters to measure electrical values. 4. Demonstrate the use of Ohm’s law and Joule’s law. 5. Demonstrate procedures for testing fuses and capacitors. 6. Demonstrate procedures for building series, parallel, and series-parallel circuits. Learning Objective(s) 1. Obtain safe operation skills regarding the use of electrical meters and measuring devices. 2. Demonstrate the ability to calculate resistance, amperage, voltage using Ohm’s Law and derivatives of Ohm’s Law such as the Power Circle 3. Demonstrate the ability to measure resistance, amperage, voltage with analog and digital multi-meters. 4. Demonstrate the ability to test electrical components 5. Build and test electrical circuits.</p>	

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<p>MODULE C – WIRING FUNDAMENTALS Competency: C1.0 Construct basic electrical circuits. Performance Objective: C1.1 Using an electric circuit previously developed by the student, construct a basic electric circuit and test the circuit to determine proper operation. Learning Objectives: C1.1.1 Explain NEC requirements for specified applications. C1.1.2 Explain characteristics of various types of electrical wire connectors. C1.1.3 Explain considerations for connecting and testing electrical wire for specified applications. Performance Objective: C1.2 Install specified electrical components and test to determine proper operation. Learning Objectives: C2.1.1 Identify characteristics of electrical cords and plugs. C2.1.2 Explain safety considerations when replacing faulty electrical cords. C2.1.3 Explain the operating principles of a GFI receptacle. C2.1.4 Explain considerations when installing GFI receptacles. C2.1.5 Explain considerations when constructing common control circuits.</p>	<p>Unit 7-9 – Components Content Standard(s) 7. Determine the functional condition of motor windings in a single-phase compressor. 8. Demonstrate testing procedures for electrical components, including fan relays, contactor relays, capacitors, and motor windings. 9. Determine procedures for measuring heat anticipator amperes. Learning Objective(s) 1. Explain the function of motor windings 2. Discuss motor winding condition 3. Test motor windings 4. Identify relays, contactors, capacitors 5. Discuss the function of relays, contactors, capacitors 6. Test relays, contactors, capacitors 7. Discuss procedures measuring heat anticipator amperes 8. Measure heat anticipator amperes. Unit 10-13 – Installation Content Standard(s) 10. Demonstrate procedures for installing heating and cooling thermostats. 11. Explain conductors, insulators, and related symbols used in HVACR. 12. Demonstrate procedures for making proper electrical connections. 13. Explain various types of wiring diagrams, including pictorial, line, and schematic used in HVACR. Learning Objective(s) 1. Explain the function of heating and cooling thermostats. 2. Explain procedures for installing heating and cooling thermostats.</p>	

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	<ol style="list-style-type: none">3. Install heating and cooling thermostats.4. Explain the function of conductors and insulators5. Identify and define electrical related symbols used in HVACR.6. Discuss the importance of making proper electrical connections.7. Demonstrate the ability to make proper electrical connections.8. Explain various types of wiring diagrams, including pictorial, line, and schematic used in HVACR.	