Alabama
Department of
Postsecondary Education

Representing the Alabama Community College System

STATEWIDE CAREER/TECHNICAL EDUCATION COURSE ARTICULATION REVIEW MINUTES

Articulation Agreement Identifier: ELT 110 2005-1 Identifier is the postsecondary course prefix followed by Plan-of-Instruction version number (e.g.; INT 100 (2005-1)).

Applicable CIP code(s): 46.0302
Postsecondary course prefix, number, and title: ELT 110 – Wiring Methods

Secondary Course(s) of Study: 431509/430058 - Direct Current + 431510/430059 - Alternating Current + 430301/430051 - Basic Wiring

Initial Review: October 8, 2009 DPE Annual Review: February 15, 2012

Effective date: **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 Course(s) and Location(s)	TEDAC Comments

Module A
 	
Competency:
• Use hand tools safely
 	
Objectives:
• Identify proper tools and utilize in a safe manner.
• Perform safety checks of equipment, tools and accessories safely.
  • Identify the steps associated with safety checks of equipment, tools and accessories.
  • Explain hazards associated with specific types of equipment and tools
  • Use tools safely.
	Basic Wiring, Unit 1-2, Safety
	Content Standards
	
	1. Demonstrate use of safety procedures as recognized by governing agencies and approved industry standards when testing and replacing components or installing wiring.
	Examples: lockout, tag out
	2. Demonstrate how to avoid and minimize electrical hazards in the workplace.
	
	Learning Objectives
	
	1. Identify the responsibilities and personal characteristics of a professional crafts person.
	2. Explain the role that safety plays in the construction crafts.
	3. Describe what job-site safety means.
	4. Explain the appropriate safety precautions around common job-site hazards.
	5. Demonstrate the use and care of appropriate personal protective equipment.
	6. Follow safety procedures for lifting heavy objects.
	7. Describe safe behavior on and around ladders and scaffolds.
	8. Explain the importance of the HazCom (Hazard communication standard) requirement and MSDSs (material safety data sheets).
	9. Describe fire prevention and fire fighting techniques.
	10. Define safe work procedures around electrical hazards.	

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Module B **Competency:** • Install electrical wiring, equipment, apparatuses, and fixtures **Objectives:** • Install basic electrical wiring, equipment, apparatuses, and associated fixtures within NEC and other identified regulatory requirements or codes. **Competency:** • Connect conductors **Objectives:** • Connect conductors using various connections within NEC and other identified regulatory and code requirements. **Competency:** • Splice conductors **Objectives:** • Splice conductors using various hardware within NEC and other identified regulatory and code requirements. **Competency:** • Terminate conductors **Objectives:** Terminate conductors using various hardware within NEC and other identified regulatory and code requirements**.** **Competency:** • Use a multimeter **Objectives:** • Use a multimeter to measure various continuity parameters including resistances, voltages, etc.	**Basic Wiring, Unit 4-6, Hand Bending** **Content Standards** 4. Use mathematical formulas to determine conduit and electrical metallic tubing (EMT) bends. 5. Perform bending of EMT and conduit used in basic wiring applications according to specifications. Examples: offsets, stub-ups, saddle bends 6. Prepare conduit for installation, including inspecting, cutting, and reaming. **Learning Objectives** 1. Identify the methods of hand bending conduit 2. Identify various methods used to install conduit. 3. Use math formulas to determine conduit bends. 4. Make 90 degree bends, back-to-back bends, offsets, kicks, and saddle bends using a hand bender. 5. Cut, ream, and thread conduit. **Basic Wiring, Unit 7, Fasteners and Anchors** **Content Standards** 7. Install fasteners, anchors, and hardware according to specifications. **Learning Objectives** 1. Identify and explain the use of threaded fasteners. 2. Identify and explain the use of non-threaded fasteners. 3. Identify and explain the use of anchors. 4. Demonstrate the correct applications for fasteners. 5. Install fasteners and anchors.	

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Competency: • Use an inductive voltage detector **Objectives:** • Utilize an inductive voltage detector to measure various induced voltage parameters. **Competency:** • Use an ohmmeter **Objectives:** • Utilize an ohmmeter to measure various resistance parameters. **Competency:** • Check fuse for open links **Objectives:** • Perform check on fuse(s) for open links and determine serviceability. **Competency:** • Read and interpret blueprints and schematics **Objectives:** • Read and interpret electrical diagrams and blueprints **Learning Objectives** • Identify insulation types • Identify conductor types and properties • Identify wiring components • Identify wiring symbols/design blueprints • Correctly size and derate conductor types • Discuss conductor temperature ratings • Discuss voltage drop and how it effects the branch circuit • Correctly strip solid and stranded conductors of various sizes • Identify types of over-current protection • Identify and interpret electrical diagrams and blueprints.	**Basic Wiring, Unit 8, Raceways, Boxes and Fittings Content Standards** 8. Demonstrate installation procedures for electrical boxes, fittings, and raceways used in basic wiring. **Learning Objectives** 1. Describe various types of cable trays and raceways. 2. Identify and select various types and sizes of raceways. 3. Identify and select various types and sizes of cable trays. 4. Identify and select various types of raceway fittings. 5. Identify various methods used to install raceways. 6. Demonstrate knowledge of NEC® raceway requirements. 7. Describe procedures for installing raceways and boxes on masonry surfaces. 8. Describe procedures for installing raceways and boxes on concrete surfaces. 9. Describe procedures for installing raceways and boxes in a metal stud environment. 10. Describe procedures for installing raceways and boxes in a wood frame environment. 11. Describe procedures for installing raceways and boxes on drywall surfaces. 12. Recognize safety precautions that must be followed when working with boxes and raceways. **Basic Wiring, Unit 9-11, Commercial and Industrial Wiring** **Content Standards** 9. State functions of electrical switches and disconnects commonly used in wiring applications.	

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	10. State functions of receptacles commonly used in basic wiring applications. 11. State functions of limiting devices commonly used in wiring applications. **Learning Objectives** 1. Identify and state the functions and ratings of single-pole, double pole, three-way, four-way, dimmer, special, and safety switches. 2. Explain NEMA classifications as they relate to switches and enclosures. 3. Explain NEC requirements as they relate to switches and enclosures. 4. Identify and state the functions and ratings of straight blade, twist-lock, and pin and sleeve receptacles. 5. Identify and define receptacle terminals and disconnects. 6. Identify and define ground fault circuit interrupters. 7. Explain the box mounting requirements in the NEC. 8. Use a wire stripper to strip insulation from a wire. 9. Use a solder less connector to splice wires together. 10. Identify and state the functions of limit switches and relays. 11. Identify and state the function of switchgear. **Basic Wiring, Unit 12-15, Wiring Applications Content Standards** 12.Demonstrate the use of conductors and cables in wiring applications. 13.Select materials to complete a specified wiring project. • Constructing a wiring project to specification 14.Create written drawings of a project wiring scheme. 15.Estimate material costs for wiring applications based on wiring drawings.	
Module C **Competency:** • Connect conductors using various connections **Objectives:** • Connect conductors using the pigtail connection • Connect conductors using the compression connection **Competency:** • Splice conductors using various hardware **Objectives:** • Splice conductors using wire-nuts • Splice conductors using wing-nuts • Splice conductors using scotcholks • Splice conductors using solderless conductors • Splice conductors using split-bolt connectors • Splice conductors using crimp connectors **Competency:** • Terminate conductors using specified hardware **Objectives:** • Terminate conductors using wire-nuts **Learning Objectives**		

Postsecondary Course Objectives	Secondary Course(s) and Location(s)	TEDAC Comments
• Connect conductors using the western union connection • Connect conductors using the pigtail connection • Connect conductors using the compression connections • Splice and terminate conductors suing wire-nuts • Splice and terminate conductors using wing-nuts • Splice and terminate conductors using scotchloks • Splice and terminate conductors using solderless connectors • Splice and terminate conductors using split-bolt connectors Splice and terminate conductors using crimp connectors **Module D** **Competency:** • Install electrical wiring, equipment, apparatus, fixtures and support systems. **Objectives:** • Wire an electrical circuit according to a diagram. • Test the circuit for continuity. **Learning Objectives** • Design and install single-pole switch control lighting circuits • Design and install two switch control lighting circuits • Design and install three switch control lighting circuits • Design and install four switch control lighting circuits • Design and install five switch control lighting circuits • Design and install receptacles using feed-thru terminals • Design and install receptacles using pigtail splices • Design and install receptacles using split circuit method • Install electrical equipment and devices using correct connector and bonding methods • Understand electrical equipment and devices using correct	**Learning Objectives** 1. Explain the various sizes and gauges of wire in accordance with American Wire Gauge standards. 2. Identify insulation and jacket types according to conditions and applications. 3. Describe voltage ratings of conductors and cables. 4. Read and identify markings on conductors and cables. 5. Use the tables in the NEC to determine the ampacity of a conductor. 6. Interpret electrical drawings, including site plans, floor plans, and detail drawings. 7. Identify common symbols used on blueprints. 8. Select the proper wiring methods for various types of residences. 9. Make a materials take-off. 10. Complete a cost estimate for the project. **Basic Wiring, Unit 16-20, Basic Motors** **Content Standards** 16. Identify electric motors by construction and frame type. 17. Describe the operating characteristics of direct current (DC) shunt, series, and compound motors. 18. Describe dual-voltage motors and their applications. 19. Explain relationships among motor voltage, system voltage, speed, and frequency. 20. Demonstrate how to change the polarity of alternating current (AC) and DC motors. **Learning Objectives** 1. Describe the various types of motor enclosures. 2. Describe how the rated voltage of a motor differs from the system voltage.	

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connector and bonding methods	3. Describe how torque is developed in an induction motor. 4. Explain how the direction of a three-phase motor is reversed. 5. Explain the relationships among speed, frequency, and the number of poles in a three-phase induction motor. 6. Describe the design and characteristics of a DC shunt, series, and compound motor. 7. Explain how the rotation of a DC motor is changed. 8. Describe the methods for determining various motor connections. 9. Describe general motor protection requirements as delineated in the NEC.	