Alabama Department of Postsecondary Education

Representing the Alabama Community College System

STATEWIDE CAREER/TECHNICAL EDUCATION COURSE ARTICULATION REVIEW MINUTES

Articulation Agreement Identifier: AUM/ASE 112 (2010-1) Identifier is the postsecondary course prefix followed by Plan-of-Instruction version number (e.g.; INT 100 (2005-1)).

Applicable CIP code(s): 47.0604/15.0803

Postsecondary course prefix, number, and title: AUM/ASE 112 Electrical Fundamentals

Secondary Course(s) of Study: 471106/570025 - Automotive Electrical & Electronic Systems I + 471107/570026 - Automotive Electrical & Electronic Systems II

Initial Review: March 25, 2010 Annual DPE Review: January 30, 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
Professional Competencies A1.0 Comprehend basic electrical principles. **Learning Objectives** A1.1.1 Define various terms associated with electricity. A1.1.2 Identify the components of atomic structure. A1.1.3 Differentiate between conductors and insulators. A1.1.4 Identify the properties of electricity. A1.1.5 Explain electrical quantities such as voltage, current, resistance, and power. A1.1.6 Identify electrical units of measure such as volts, amperes, ohms, and watts. A1.1.7 Explain Ohm's law formulas. A1.1.8 Calculate circuit values using Ohm's law. A1.1.9 State the direction of electron movement between two charges, given their polarity. A1.1.10 Explain the function of resistance in electrical circuits A1.1.11 Explain the purpose of resistors A1.1.12 Identify resistors value and tolerance by color code A1.1.13 Explain the purpose of a Rheostat A1.1.14 Explain the purpose of a Potentiometer	**Electrical & Electronic Systems I, Unit 2-5** **Content Standards** 2. Diagnose electrical and electronic system problems. 3. Identify electrical and electronic systems concerns. • Determining necessary action for electrical and electronic systems concerns 4. Research vehicle and service information, including vehicle service history, technical service bulletins, and interpretation of vehicle and major component identification numbers 5. Create a work order for general electrical system concerns. **Electrical & Electronic Systems I, Unit 2-5** **Learning Objectives** Students will: 1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause and correction. 2. Identify and interpret electrical/electronic system concern; determine necessary action. 3. Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins. 4. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals). 5. Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principals of electricity Ohm's Law). 6. Use wiring diagrams during diagnosis of electrical circuit problems. 7. Demonstrate the proper use of a digital multi meter	

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Professional Competencies B1.0 Interpret wiring diagrams. **Performance Objectives** B1.1 Use service manual to diagnose and repair electronic circuits. **Learning Objectives** B1.1.1 Identify wire size from wiring diagram. B1.1.2 Identify connectors. B1.1.3 Identify wire colors. B1.1.4 Identify electronic symbols. **Performance Objectives** B1.2 Use service manual to identify series, parallel, and series-parallel circuits in the wiring diagrams. **Learning Objectives** B1.2.1 Identify series, parallel, and series-parallel circuits. B1.2.2 Explain the function of series, parallel, and series-parallel circuits. B1.2.3 Define series, parallel, and series-parallel circuit laws.	[DMM] during diagnosis of electrical circuit problems. 8. Check electrical circuits with a test light; determine necessary action. 9. Measure source voltage and perform voltage drop tests in electrical/electronic circuits using a volt meter; determine necessary action. 10. Measure current flow in electrical/electronic circuits using ammeter; determine necessary action. 11. Check continuity and measure resistance in electrical/electronic circuits and components using an ohmmeter; determine necessary action. 12. Check electrical circuits using fused jumper wires; determine necessary action. 13. Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action. 14. Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action. 15. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. 16. Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action. 17. Remove and replace terminal end from connector.	

Postsecondary Course Objectives	Secondary Course(s) and Location(s)	TEDAC Comments
Professional Competencies C1.0 Safely use test equipment. **Performance Objectives** C1.1 Select the appropriate test equipment for each assigned task and use it safely measuring voltage, current, and resistance as assigned. **Learning Objectives** C1.1.1 Identify various pieces of test equipment such as a scan tool, multi-meter, and test light. C1.1.2 Explain the appropriate use of a scan tool, multi-meter, and test light. C1.1.3 Explain the proper use of electronic diagnostic test equipment. **Professional Competencies** C2.0 Diagnose electrical circuits. **Performance Objectives** C2.1 Diagnose electrical circuits and correctly identify the malfunction. **Learning Objectives** C2.1.1 Explain the process for identifying an open in an electrical circuit. C2.1.2 Explain the process for identifying a short in an electrical circuit. C2.1.3 Explain the process for identifying a current flow problem in an electrical circuit. C2.1.4 Explain the process for identifying a voltage problem in an electrical circuit. C2.1.5 Explain the process for identifying a power problem in an electrical circuit.	**Electrical & Electronic Systems II, Unit 2-3** **Content Standards** 2. Evaluate electrical and electronic systems diagnoses to determine necessary actions. • Verifying customer concerns regarding electric and electrical systems 3. Justify necessary action for electrical and electronic systems concerns. **Learning Objectives** 1. Locate source of system failure. 2. Evaluate source of system failure. 3. Confirm findings and customer concerns. 4. Conduct research and planning to resolve electronic system failure or malfunction. 5. Prepare written plan for repair. 6. Prepare repair estimates.	

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Professional Competencies D1.0 Construct and repair circuits. **Performance Objectives** D1.1 Repair opens and shorts in wire, connectors, and terminals. **Learning Objectives** D1.1.1 Identify connectors and terminals. D1.1.2 Identify wire size and types. D1.1.3 Define conductors. D1.1.4 Explain the function of conductors. D1.1.5 Identify types of conductors. D1.1.6 Define insulators. D1.1.7 Explain the function of insulators. D1.1.8 Identify insulators. D1.1.9 Describe standard wire gage sizes. D1.1.10 Identify types of wire connectors. D1.1.11 Describe the purpose of connectors. D1.1.12 Define wire resistance. **Performance Objectives** D1.2 Build assigned circuits, solder wires, connectors, terminals and verify proper function. **Learning Objectives** D1.2.1 Identify common types of solder. D1.2.2 Explain the function of soldering. D1.2.3 Describe the process of soldering. D1.2.4 Explain the use of flux. D1.2.5 Use OHM's law to build, calculate, and measure various circuits.	**Electrical & Electronic Systems I, Unit 2-5** **Content Standards** 2. Diagnose electrical and electronic system problems. 3. Identify electrical and electronic systems concerns. • Determining necessary action for electrical and electronic systems concerns 4. Research vehicle and service information, including vehicle service history, technical service bulletins, and interpretation of vehicle and major component identification numbers 5. Create a work order for general electrical system concerns. **Electrical & Electronic Systems I, Unit 2-5** **Learning Objectives** Students will: 1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause and correction. 2. Identify and interpret electrical/electronic system concern; determine necessary action. 3. Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins. 4. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals). 5. Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principals of electricity Ohm's Law). 6. Use wiring diagrams during diagnosis of electrical circuit problems. 7. Demonstrate the proper use of a digital multi meter [DMM] during diagnosis of electrical circuit problems.	

Postsecondary Course Objectives	Secondary Course(s) and Location(s)	TEDAC Comments
	8. Check electrical circuits with a test light; determine necessary action. 9. Measure source voltage and perform voltage drop tests in electrical/electronic circuits using a volt meter; determine necessary action. 10. Measure current flow in electrical/electronic circuits using ammeter; determine necessary action. 11. Check continuity and measure resistance in electrical/electronic circuits and components using an ohmmeter; determine necessary action. 12. Check electrical circuits using fused jumper wires; determine necessary action. 13. Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action. 14. Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action. 15. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. 16. Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action. 17. Remove and replace terminal end from connector. 18. Repair connectors and terminal ends. 19. Repair wiring harness (including CAN/BUS systems). 20. Perform solder repair of electrical wiring.	