Course Outline for Automotive Technology 6B

AUTOMOTIVE ELECTRICAL AND ELECTRONIC SYSTEMS

Catalog Description:
ATEC 6B - Automotive Electrical and Electronic Systems
(See also APAU 9748) 3.00 units
Automotive body electronics, vehicle lighting, instrumentation, OEM audio, navigation, and communication systems, supplemental restraint systems, starter interlock systems, computer controlled charging systems.
Prerequisite: ATEC 6A (completed with a grade of "C" or higher) or equivalent

Grading Option: Letter Grade

Discipline:

<table>
<thead>
<tr>
<th>Units</th>
<th>Contact Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Week</td>
</tr>
<tr>
<td>Lecture</td>
<td>1.5</td>
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<tr>
<td>Laboratory</td>
<td>5</td>
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<tr>
<td>Clinical</td>
<td>0.00</td>
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<tr>
<td>Total</td>
<td>3.00</td>
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Prerequisite Skills:
Before entry into this course, the student should be able to:
1. Identify and interpret electrical/electronic system concern, and determine necessary action;
2. Diagnose electrical/electronic system integrity for series, parallel and series-parallel circuits using principles of electricity (Ohm’s Law, Watts Theory);
3. Demonstrate the proper use of a digital multimeter (DMM), test lights, logic probes, and fused jumper wires during diagnosis of electrical circuit problems;
4. Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw);
5. Inspect and test fusible links, circuit breakers, and fuses, repair wiring harnesses and connectors, and perform solder repair of electrical wiring;
6. Perform battery state-of-charge test, capacity test, and confirm proper battery capacity for vehicle application;
7. Perform battery service, perform slow/fast battery charge, inspect and clean battery cables, connectors, clamps, and hold-downs, repair or replace as needed;
8. Start a vehicle using jumper cables and a battery or auxiliary power supply;
9. Perform starter current draw tests, generator (alternator) output tests, circuit voltage drop tests;
10. Inspect and test starter relays and solenoids;
11. Remove and install starters and alternators;
12. Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment;
13. Complete DVM meter certification.

Measurable Objectives:
Upon completion of this course, the student should be able to:
1. Demonstrate the proper use of a digital multimeter (DMM), digital storage oscilloscope (DSO), test lights and fused jumper wires during diagnosis of electrical circuit problems;
2. Inspect and test fusible links, circuit breakers, and fuses, repair wiring harnesses and connectors, and perform wire and terminal repair of electrical wiring;
3. Identify and interpret electrical/electronic system concern, and determine necessary action related to body electrical systems;
4. Verify bus system communications;
5. Diagnose the cause of brighter than normal, intermittent, dim, or no light operation in lighting systems;
6. Inspect, replace, and aim headlights and bulbs;
7. Inspect and diagnose vehicle instrumentation;
8. Inspect and diagnose OEM vehicle audio systems;
9. Inspect and diagnose OEM vehicle navigation systems;
10. Inspect and diagnose OEM vehicle communication systems;
11. Diagnose, service and repair of supplemental restraint systems;
12. Inspect and diagnose starter interlock systems;
13. Inspect and diagnose computer controlled charging systems;
14. Inspect and diagnose OEM power window systems;
15. Inspect and diagnose OEM locking systems.

Course Content:
Course Content (Lecture):
1. Fundamentals of body electronics
2. Input, Processing, Output
3. Bus systems
4. Lighting systems
5. Instrumentation
6. OEM Audio systems
7. OEM Navigation systems
8. OEM Communication systems
9. Supplemental Restraint systems
10. Starter Interlock systems
11. Computer Controlled Charging systems
12. Power Windows
13. Locking Systems
14. Hybrid, electric, and alternative fuel safety
15. Hybrid, electric, and alternative fuel applicable systems awareness
16. Soft Skills

Course Content (Laboratory):
1. Demonstrate proper shop safety and working practices, including tools and equipment, and hazardous waste handling
2. Diagnosis and repair of body electrical systems
3. Bus system testing
4. Diagnosis and repair of vehicle lighting systems
5. Diagnosis and repair of vehicle instrumentation systems
6. Diagnosis and repair of vehicle audio, navigation, and communication systems
7. Diagnosis and repair of vehicle supplemental restraint systems
8. Diagnosis and repair of starter interlock systems
9. Diagnosis and repair of computer controlled charging systems
10. Diagnosis and repair of power window systems
11. Diagnosis and repair of locking systems

Methods of Presentation
1. Lecture/Discussion
2. Demonstration
3. Guest speakers
4. Laboratory
5. Field Trips

Assignments and Methods of Evaluating Student Progress

1. Typical Assignments
   A. Read chapter on Lighting.
   B. Complete review quiz at the end of chapter.
   C. Complete laboratory assignments using service information, lecture materials, and text.

2. Methods of Evaluating Student Progress
   A. Class Participation
   B. Laboratory exercises
   C. Homework
   D. Quizzes
   E. Midterm Examination
   F. Final Examination or Project
   G. Practical Examination

3. Student Learning Outcomes
   Upon the completion of this course, the student should be able to:
   A. Test the CAN bus system signal with a DSO. Set up the DSO to capture the CAN hi (+) and CAN lo (-) signals.
   B. Test a computer controlled charging system for proper operation using a DSO. Check and record the signal on a DSO from the PCM to the generator.
   C. Check a variable speed blower control system for proper operation using a DSO. Check and record the HZ signal from the control head to the blower module.

Textbook (Typical):

Special Student Materials
1. Shop/safety clothing
2. Safety glasses

Abbreviated Class Schedule Description:

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