Course Outline for Automotive Technology 91

HYBRID DIAGNOSIS AND ALTERNATE FUELS TECHNOLOGY

Catalog Description:
ATEC 91 - Hybrid Diagnosis and Alternate Fuels Technology
(See also APAU 9751) 2.00 units
Hybrid vehicle diagnosis and repair processes, and alternate fuels application and operation.
Prerequisite: ATEC 90 (completed with a grade of "C" or higher)

Grading Option: Letter Grade

Discipline:

<table>
<thead>
<tr>
<th>Units</th>
<th>Contact Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Week Term</td>
</tr>
<tr>
<td>Lecture</td>
<td>3  24.00</td>
</tr>
<tr>
<td>Laboratory</td>
<td>4  32.00</td>
</tr>
<tr>
<td>Clinical</td>
<td>0.00  0.00</td>
</tr>
<tr>
<td>Total</td>
<td>2.00  7.00  56.00</td>
</tr>
</tbody>
</table>

Prerequisite Skills:
None

Measurable Objectives:
Upon completion of this course, the student should be able to:
1. demonstrate the appropriate use of personal protection equipment;
2. compare and contrast the different types of high voltage batteries used in hybrid and electric vehicles;
3. perform a removal of, and the appropriate tests to, the high voltage battery;
4. perform a removal of the Converter / Inverter assembly;
5. perform a cooling system service for the Converter / Inverter system;
6. compare and contrast the pros and cons of electric vehicles;
7. evaluate the condition of motor windings;
8. compare and contrast the pros and cons of gasoline and diesel engines;
9. examine the benefits of alternate fuels for use in hybrid vehicles.

Course Content:

Course Content (Lecture):
1. Capacitors and High Voltage Batteries
   A. Attributes
   B. Plug-In Technology
   C. Removal
   D. Testing
2. Inverters and Converters
   A. Removal
   B. Testing
3. Electric Motors
   A. Operation
   B. Testing
   C. Test equipment
4. Electric Vehicles
   A. Current Models
   B. Charging Options
   C. Benefits of
   D. Negatives of
5. Clean Diesel
   A. Benefits
   B. Hybrid vehicle application
   C. Attributes
   D. Engines
   E. Emission Devices
6. Alternate Fuels
   A. Benefits
   B. Hybrid vehicle application
   C. E85
   D. CNG
   E. LPG
7. Hydrogen as a fuel
   A. Benefits
Course Content (Laboratory):

1. Demonstrate the proper methods to perform a glove check
2. Collect the appropriate service information related to disabling the high voltage system
3. Remove high voltage battery assembly
4. Remove the Inverter / Converter assembly
5. Perform tests on electric motors
6. Identify system components for diesel and alternate fuel vehicles

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 Hybrid Batteries and Battery Service.
   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. Final Examination or Project
   F. Practical Examination

3. Student Learning Outcomes
   Upon the completion of this course, the student should be able to:
   A. Demonstrate proper methods for glove testing.
   B. Demonstrate the proper use of a volt meter in performing high voltage battery testing.
   C. Demonstrate the proper use of ohm meters for motor testing.

Textbook (Typical):

Special Student Materials

1. Safety glasses
2. Shop/safety clothing
3. Notebook and pencils

Abbreviated Class Schedule Description:
Hybrid vehicle diagnosis and repair processes, and alternate fuels application and operation.
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