JEFFERSON COLLEGE

COURSE SYLLABUS

AUT161

INTRODUCTION TO ENGINE PERFORMANCE

1 Credit Hour

Prepared by:
Gerard Uhls and Gary Boyher

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October 24, 2013

Dena McCaffrey, Ed.D., Dean, Career and Technical Education
I. CATALOGUE DESCRIPTION

A. Prerequisites: AUT141 Automotive Steering and Suspension Systems with a grade of “C” or better
AUT142 Automotive Steering and Suspension Systems Lab with a grade of “C” or better
AUT151 Automotive Engine Repair with a grade of “C” or better
AUT152 Automotive Engine Repair Lab with a grade of “C” or better
Reading Proficiency

Co-requisite: AUT162 Introduction to Engine Performance Lab

B. 1 semester credit hour

C. Introduction to Engine Performance is the study of various engine components and subsystems and how these affect engine performance. The emphasis is on the theory and operation of engine components and subsystems. The course will focus on classroom study of how components and subsystems function and are interrelated. Completion of this course will help the student prepare for entry level employment and passing the National Institute for Automotive Service Excellence (ASE) Engine Repair Test (A1) and the Engine Performance Test (A8). (S, SU)

II. EXPECTED LEARNING OUTCOMES/ASSESSMENT MEASURES

| A. Diagnosis of Exhaust | P-1 | Classroom discussions
| Demonstrate an understanding of completing a work order to include customer information, vehicle identification, information, customer concern, related service history, cause, and correction |  | Lecture
|  | Classroom exercises
|  | Reading assignments
|  | Written tests
| Demonstrate an understanding of identifying and interpreting engine performance concern; determine necessary action | P-1 | Classroom discussions
|  | Lecture
|  | Classroom exercises
|  | Reading assignments
|  | Written tests
| Demonstrate an understanding of researching applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins | P-1 | Classroom discussions
|  | Lecture
|  | Classroom exercises
|  | Reading assignments
<p>|  | Written tests |</p>
<table>
<thead>
<tr>
<th>Demonstrate an understanding of locating and interpreting vehicle and major component identification numbers</th>
<th>P-1</th>
<th>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</th>
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</thead>
<tbody>
<tr>
<td>Demonstrate an understanding of inspecting engine assembly for fuel, oil, coolant, and other leaks; determine necessary action</td>
<td>P-2</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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<td>Demonstrate an understanding of diagnosing abnormal engine noise or vibration concerns; determine necessary action</td>
<td>P-3</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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<tr>
<td>Demonstrate an understanding of diagnosing abnormal exhaust color, odor, and sound; determine necessary action</td>
<td>P-2</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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<td>B. Compression Testing</td>
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<td>Demonstrate an understanding of performing cylinder cranking and running compression tests; determine necessary action</td>
<td>P-1</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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<td>C. Cylinder Leakage Testing</td>
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<tr>
<td>Demonstrate an understanding of performing cylinder leakage test; determine necessary action</td>
<td>P-1</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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<td>D. Cooling System Operation and Testing</td>
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<tr>
<td>Demonstrate an understanding of verifying engine operating temperature; determine necessary action</td>
<td>P-1</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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<tr>
<td>Demonstrate an understanding of performing cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action</td>
<td>P-1</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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<td>Demonstrate an understanding of removing and replacing thermostat and gasket/seal</td>
<td>P-1</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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<tr>
<td>Demonstrate an understanding of inspecting and testing mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action</td>
<td>P-1</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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<td><strong>E. Mechanical Timing of an Engine</strong></td>
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<td>Demonstrate an understanding of verifying correct camshaft timing</td>
<td>P-1</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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<tr>
<td>Demonstrate an understanding of adjusting valves on engines with mechanical or hydraulic lifters</td>
<td>P-1</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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<tr>
<td>Demonstrate an understanding of removing and replacing timing belt; verify correct camshaft timing</td>
<td>P-1</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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<td><strong>F. PCV System</strong></td>
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<td>Demonstrate the knowledge of inspecting positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action</td>
<td>P-2</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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<td><strong>G. Related Service</strong></td>
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<td>Demonstrate an understanding of performing common fastener and thread repairs, to include: remove broken bolt, restore internal and external threads, and repair internal threads with a threaded insert</td>
<td>P-1</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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<td>Demonstrate an understanding of performing an engine oil and filter change</td>
<td>P-1</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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<td>Demonstrate an understanding of identifying hybrid vehicle internal combustion engine service precautions</td>
<td>P-3</td>
<td>Classroom discussions Lecture Classroom exercises Reading assignments Written tests</td>
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### III. OUTLINE OF TOPICS

**A. Diagnosis of Exhaust**
1. Perform visual inspection of an exhaust system
2. Determine cause of abnormal conditions
3. Determine corrective action

**B. Compression Testing**
1. Discuss how to prepare an engine for compression testing
2. Discuss how to perform a compression test using a mechanical gauge
3. Discuss test results and determine appropriate action

**C. Cylinder Leakage Testing**
1. Discuss how to prepare an engine for a cylinder leakage test
2. Discuss how to perform a cylinder leakage test on the engine
3. Discuss how to interpret test results
4. Determine appropriate action

**D. Cooling System Operation and Testing**
1. Discuss thermostat, radiator, hoses and cooling fans
2. Discuss performing visual inspection of the cooling system
3. Discuss performing a cooling system pressure test
4. Discuss how to interpret test results and determine appropriate action

**E. Mechanical Timing of an Engine**
1. Discuss mechanical time and how to verify mechanical time of an engine (All three camshaft drives will be covered)

**F. PCV System**
1. Perform a visual inspection of the PCV system
2. Determine appropriate action

**G. Related Service**
IV. METHODS OF INSTRUCTION
   A. Classroom discussion
   B. Lecture

V. Group Activities

VI. REQUIRED TEXTBOOKS
   Halderman, James, *Automotive Engines, Theory and Servicing*, Prentice Hall (current edition)

VII. REQUIRED MATERIALS
   A. Jefferson College Automotive Technology Shirt (2)
   B. Safety Glasses (Clear)
   C. Shop Boots (Steel Toe Preferred)

VIII. SUPPLEMENTAL REFERENCES
   None

IX. METHODS OF EVALUATION
   A. 50% Tests
   B. 50% Homework
   C. Attendance: classroom policy

X. ADA AA STATEMENT
   Any student requiring special accommodations should inform the instructor and the Coordinator of Disability Support Services (Library; phone 636-481-3169).

XI. ACADEMIC STATEMENT
   All students are responsible for complying with campus policies as stated in the Student Handbook (see College Website, http://www.jeffco.edu).
XII. ATTENDANCE STATEMENT

Regular and punctual attendance is expected of all students. Any one of these four options may result in the student being removed from the class and an administrative withdrawal being processed: (1) Student fails to begin class; (2) Student ceases participation for at least two consecutive weeks; (3) Student misses 15 percent or more of the coursework; and/or (4) Student misses 15 percent or more of the course as defined by the instructor. Students earn their financial aid by regularly attending and actively participating in their coursework. If a student does not actively participate, he/she may have to return financial aid funds. Consult the College Catalog or a Student Financial Services representative for more details.

XIII. OUTSIDE OF CLASS ACADEMICALLY RELATED ACTIVITIES

The U.S. Department of Education mandates that students be made aware of expectations regarding coursework to be completed outside the classroom. Students are expected to spend substantial time outside of class meetings engaging in academically related activities such as reading, studying, and completing assignments. Specifically, time spent on academically related activities outside of class combined with time spent in class meetings is expected to be a minimum of 37.5 hours over the duration of the term for each credit hour.