

**JEFFERSON COLLEGE**

**COURSE SYLLABUS**

**AUT161**

**INTRODUCTION TO ENGINE PERFORMANCE**

1 Credit Hour

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## **AUT161 Introduction to Engine Performance**

### **I. CATALOGUE DESCRIPTION**

- A. Pre-requisites: 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**

<b>A. Diagnosis of Exhaust</b>		
Demonstrate an understanding of identifying and interpreting engine performance concern; determine necessary action	P-1	Classroom Discussions Lectures 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 Lectures Classroom Exercises Reading Assignments Written Tests

Demonstrate an understanding of diagnosing abnormal engine noise or vibration concerns; determine necessary action	P-3	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate an understanding of excessive oil consumption excessive coolant consumption, unusual exhaust color, odor, and sound; determine necessary action	P-2	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests

### **B. Cylinder Pressure Tests**

Demonstrate an understanding of performing engine absolute (vacuum/boost) manifold pressure tests; determine necessary action	P-1	Classroom Discussions Lecture Classroom Exercises Reading Assignments Written Tests
Demonstrate an understanding of performing cylinder cranking and running compression tests; determine necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate an understanding of performing cylinder leakage test; determine necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests

### **C. Cooling System Operation and Testing**

Demonstrate an understanding of performing cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, and heater core and galley plugs; determine necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate an understanding of verifying engine operating temperature; determine necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests

Demonstrate an understanding of identifying the causes of engine overheating	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate an understanding of inspecting and testing coolant, draining and recovering coolant, flushing and refilling cooling system with recommended coolant; bleeding air as required	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate an understanding of removing and replacing radiator	P-2	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate an understanding of removing, inspecting and replacing thermostat and gasket/seal	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate an understanding of inspecting and testing fan(s) (electrical or mechanical), fan clutch, fan shroud, air dams	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests

<b>D. Lubrication System</b>		
Demonstrate an understanding of performing oil pressure tests	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate an understanding of performing on oil change	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate an understanding of inspecting auxiliary coolers; determine necessary action	P-3	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests

Demonstrate an understanding of inspecting, testing, and replacing oil temperature and pressure switches and sensors	P-2	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
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<b>E. PCV System</b>		
Demonstrate the knowledge of inspecting, testing and servicing positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action	P-2	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate an understanding of diagnosing oil leaks, emissions, and driveability concerns caused by the positive crankcase ventilation system; determine necessary action	P-3	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests

<b>F. Air Induction, and Exhaust Systems Diagnosis and Repair</b>		
Demonstrate an understanding of inspecting, servicing, or replacing air filters, filter housings, and intake duct work	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate an understanding of inspecting the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tailpipe(s), heat shield(s); perform necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests

### III. OUTLINE OF TOPICS

- A. Intake and Exhaust Systems
  1. Perform visual inspection of complete intake and exhaust system
  2. Determine cause of abnormal conditions
  3. Determine corrective action
  4. Explain how to service the intake and exhaust system
  
- B. Compression Testing
  1. Discuss how to prepare an engine for compression testing
  2. Discuss how to perform a wet, dry and running compression tests using 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
  - 5. Explain cooling system flow in bypass and full flow.
  - 6. Explain how to determine proper engine operating temperature
  
- E. Lubrication System Operation and Testing
  - 1. Discuss full flow wet sump lubrication systems
  - 2. Discuss oil pressure testing and how to interpret results
  - 3. Discuss the importance of the oil change and service schedules
  - 4. Explain the pressure switch
  
- F. PCV System
  - 1. Describe the function of the PCV system
  - 2. Describe how to test the PCV System using various methods
  - 2. Determine appropriate action

#### IV. METHOD(S) OF INSTRUCTION

- A. Classroom Discussions
- B. Lectures
- C. Group Activities

#### VI. REQUIRED TEXTBOOK(S)

Halderman, James, *Automotive Engines, Theory and Servicing*, Pearson (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. Tests 50%

B. Homework 50%

IX. ADA AA STATEMENT

Any student requiring special accommodations should inform the instructor and the Coordinator of Disability Support Services (Technology Center 101; phone 636-481-3169).

X. ACADEMIC HONESTY STATEMENT

All students are responsible for complying with campus policies as stated in the Student Handbook (see College Website <http://www.jeffco.edu>).

XI. 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.

XII. 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.