

JEFFERSON COLLEGE

COURSE SYLLABUS

AUT152

AUTOMOTIVE ENGINE REPAIR LAB

3 Credit Hours

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AUT152 AUTOMOTIVE ENGINE REPAIR LAB

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
 Reading Proficiency
 Co-requisite: AUT151 Automotive Engine Repair
- B. 3 Credit Hours
- C. Automotive Engine Repair Lab is the hands-on study of the design and construction of automotive engines. The emphasis is on general engine diagnosis and repair. The course will focus on complete engine disassembly, measurements of components and reassembly. Completion of this course will help prepare the student for entry level employment and assist the student in preparing for the National Institute for Automotive Service Excellence (ASE) Engine Repair test (A1). (S, SU)

II. EXPECTED LEARNING OUTCOMES/ASSESSMENT MEASURES

A. General Engine Diagnosis; Removal and Reinstallation (R & R)		
Demonstrate the knowledge of completing work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction	P-1	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction
Demonstrate the knowledge of researching applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins	P-1	Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins
Demonstrate the knowledge of verifying the operation of the instrument panel engine warning indicators	P-1	Verify the operation of the instrument panel engine warning indicators
Demonstrate the knowledge of inspecting the engine assembly for fuel, oil, coolant, and other leaks; determine necessary action	P-1	Inspect the engine assembly for fuel, oil, coolant, and other leaks; determine necessary action

Demonstrate the knowledge of installing engine covers using gaskets, seals and sealers as required	P-1	Install engine covers using gaskets, seals and sealers as required
Demonstrate the knowledge of removing and replacing timing belt, verify correct camshaft timing		Remove and replace timing belt; verify correct camshaft timing
Demonstrate the knowledge of performing common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert	P-1	Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert
Demonstrate knowledge of identifying hybrid vehicle internal combustion engine service precautions	P-3	Identify hybrid vehicle internal engine service precautions
Demonstrate the knowledge of inspecting, removing and replacing engine mounts	P-2	Inspect, remove and replace engine mounts
Demonstrate the knowledge of removing and reinstalling engine in an OBDII or newer vehicle, reconnect all attaching components and restore the vehicle to running condition	P-3	Remove and reinstall engine in an OBDII or newer vehicle, reconnect all attaching components and restore the vehicle to running condition

B. Cylinder Head and Valve Train Diagnosis and Repair

Demonstrate the knowledge of removing cylinder head, inspecting gasket condition, installing cylinder head and gasket, tightening according to manufacturer's specifications and procedures	P-1	Remove cylinder head, inspect gasket condition, install cylinder head and gasket, tighten according to manufacturer's specifications and procedures
Demonstrate the knowledge of cleaning and visually inspecting a cylinder head for cracks, check gasket surface area's for warpage and surface finish, check passage condition	P-1	Clean and visually inspect a cylinder head for cracks, check gasket surface area's for warpage and surface finish, check passage condition
Demonstrate the knowledge of inspecting valve springs for squareness, free height comparison and tension testing; determine necessary action		Inspect valve spring for squareness, free height comparison and tension testing; Determine Necessary Action

Demonstrate the knowledge of inspecting pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action	P-2	Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); Determine Necessary Action
Demonstrate the knowledge of adjusting valves (mechanical or hydraulic lifters)	P-1	Adjust valves (mechanical or hydraulic lifters)
Demonstrate the knowledge of inspecting and replacing camshaft and drive belt/chain includes checking drive gear wear and backlash, end play, sprocket and chain wear, overhead cam drive sprocket(s), drive belt(s), belt tension, tensioners, camshaft reluctor ring/tone-wheel, and variable valve timing components	P-1	Inspecting and replace camshaft and drive belt/chain includes checking drive gear wear and backlash, end play, sprocket and chain wear, overhead cam drive sprocket(s), drive belt(s), belt tension, tensioners, camshaft reluctor ring/tone-wheel, and variable valve timing components
Demonstrate the knowledge of establishing camshaft position sensor indexing	P-1	Establish camshaft position sensor indexing
Demonstrate the knowledge of replacing valve stem seals on an assembled engine; inspecting valve spring retainers, locks/keepers, and valve lock/keeper grooves; determine necessary action		Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks/keepers, and valve lock/keeper grooves; Determine Necessary Action
Demonstrate the knowledge of inspecting valve guides for wear, check valve stem-to-guide clearance; determine necessary action		Inspect valve guides for wear; check valve stem-to-guide clearance; Determine Necessary Action
Demonstrate the knowledge of inspecting valves and valve seats; determine necessary action		Inspect valves and valve seats; Determine Necessary Action
Demonstrate the knowledge of valve and seat machining		Machine valves and seats
Demonstrate the knowledge of checking valve spring assembled height and valve stem height; determine necessary action		Check valve spring assembled height and valve stem height; Determine Necessary Action

C. Engine Block Assembly Diagnosis and Repair

Demonstrate knowledge of disassembling engine block, cleaning and preparing components for inspection and reassembly	P-1	Disassemble engine block, cleaning and preparing components for inspection and reassembly
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Demonstrate knowledge of removing, inspecting or replacing crankshaft vibration damper (harmonic balancer)	P-2	Remove, inspect or replace crankshaft vibration damper (harmonic balancer)
Demonstrate knowledge of inspecting engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action		Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; Determine Necessary Action
Demonstrate knowledge of inspecting and measuring cylinder walls/sleeves for damage, wear, and ridges; determine necessary action		Inspect and measure cylinder walls/sleeves for damage, wear, and ridges; Determine Necessary Action
Demonstrate knowledge of deglazing and cleaning cylinder walls		Deglaze and clean cylinder walls
Demonstrate knowledge of inspecting crankshaft for straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks, check oil passage condition; measure end play and journal wear, check crankshaft position sensor reluctor ring (where applicable); determine necessary action		Inspect crankshaft for straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure end play and journal wear; check crankshaft position sensor reluctor ring (where applicable); Determine Necessary Action
Demonstrate knowledge of inspecting main and connecting rod bearings for damage and wear; determine necessary action		Inspect main and connecting rod bearings for damage and wear; Determine Necessary Action
Demonstrate knowledge of inspecting crankshaft for straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure end play and journal wear; check crankshaft position sensor reluctor ring (where applicable); determine necessary action		Inspect crankshaft for straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure end play and journal wear; check crankshaft position sensor reluctor ring (where applicable); Determine Necessary Action
Demonstrate knowledge of inspecting main and connecting rod bearings for damage and wear; determine necessary action		Inspect main and connecting rod bearings for damage and wear; Determine Necessary Action

Demonstrate knowledge of identifying piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; determine necessary action		Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; Determine Necessary Action
Demonstrate knowledge of inspecting and measuring piston skirts and ring lands; determine necessary action		Inspect and measure piston skirts and ring lands; Determine Necessary Action
Demonstrate knowledge of determining piston-to-bore clearance		Determine piston-to-bore clearance
Demonstrate knowledge of inspecting, measuring, and installing piston rings		Inspect, measure, and installing piston rings

D. Lubrication and Cooling Systems Diagnosis and Repair

Demonstrate knowledge of inspecting, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment	P-1	Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment
Demonstrate knowledge of inspecting, removing and replacing water pump	P-2	Inspect, remove and replace water pump

III. OUTLINE OF TOPICS

A. Locating Vehicle Service Information

1. Locate correct vehicle service information using Mitchell OnDemand/ALLDATA

B. Locating Vehicle Identification Information

1. Locate the VIN and interpret information
2. Locate the VECI label and interpret information
3. Locate the vehicle build sticker and interpret information
4. Locate the door placard and interpret information

C. Proper Disassembly Techniques

1. Disassemble the engine and prepare components for inspection
2. Perform all necessary visual inspections and clean components
3. Record results of inspection and measurements and determine appropriate action

- D. Precision Measuring Devices
 - 1. Measure engine components for wear using outside micrometer
 - 2. Measure engine components for wear using inside micrometers
 - 3. Measure engine components for wear using a dial indicator and dial caliper
 - 4. Measure engine components for wear using a straight edge and feeler gauge

- E. Cylinder Head Service
 - 1. Remove and clean the cylinder head
 - 2. Perform visual inspections and measurements on components of the cylinder head
 - 3. Test the cylinder head for cracks and out-of-flat
 - 4. Reassemble the cylinder head according to manufacturer's procedure

- F. Reassembly of the Engine
 - 1. Prepare all parts, gasket surfaces, gaskets, and seals for reassembly
 - 2. Assemble the short block assembly and reinstall the cylinder head
 - 3. Install camshaft drive
 - 4. Install freeze plugs, coolant pump and intake manifold

IV. METHOD(S) OF INSTRUCTION

- A. Lab Exercises

- B. Group Activities

- C. Lecture

V. REQUIRED TEXTBOOK(S)

Halderman, James, *Automotive Engines, Theory and Servicing NATEF Correlated Task Sheets* (current edition), Pearson

VI. REQUIRED MATERIALS

- A. Jefferson College Automotive Technology Shirts (2)

- B. Safety Glasses (Clear)

- C. Shop Boots (Steel Toe Preferred)

VII. SUPPLEMENTAL REFERENCES

None

VIII. METHODS OF EVALUATION

- A. Shop (NATEF Automotive competencies) 50%
- B. Technician Supplemental Tasks 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.