South Central College

AST 1712  Basic Tune Up

Course Outcome Summary

Course Information

Description
This course covers the theory and principles of operation of automotive gasoline engines, fuel systems, ignition systems, and emission systems. Prior knowledge gained by the successful completion of AST1212 is required for student success in this course.

(1 lecture credit, 1 lab credit)

Total Credits 2
Total Hours 48

Types of Instruction

Instruction Type Credits/Hours
Lecture
Lab

Pre/Corequisites

Admission into the Automotive Service program

Institutional Core Competencies

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

1. Exhibit professionalism and demonstrate proper shop safety procedures
   Learning Objectives
   Demonstrate professional conduct, act responsibly and accept responsibility for the successful and timely completion of assignments
   Identify and follow all shop safety procedures

2. Identify and explain various engine systems
   Learning Objectives
   Explain four cycle internal combustion engine operation
   Describe engine management system operation - mechanical, cooling, exhaust, fuel, ignition and emission systems
   Identify hybrid vehicle internal combustion engine service precautions.
3. **Demonstrate inspection and testing procedures**

   **Learning Objectives**
   - Inspect engine for fuel, oil, coolant or other leaks - determine necessary action
   - Check coolant condition and perform a cooling system pressure test - determine necessary action
   - Verify engine operating temperature, inspect and test the thermostat, radiator, cap, hoses, bypass, and recovery tank - determine necessary action
   - Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.
   - Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tailpipe(s), and heat shield(s); perform necessary action.
   - Perform an exhaust system backpressure test - determine necessary action
   - Perform an engine absolute (vacuum/boost) intake manifold pressure test, perform engine cranking vacuum test, test the operation of turbocharger/supercharger systems.
   - Conduct a cylinder power balance test - determine necessary action
   - Perform an engine cranking and running compression test, perform a cylinder leakage test - determine necessary action
   - Verify camshaft timing - determine necessary action
   - Inspect and test the primary ignition circuit, wiring, crankshaft and camshaft position sensor(s), ignition module and other solid state ignition components
   - Inspect and test the distributor, coil, ignition secondary wiring and components - determine necessary action
   - Inspect and test the PCV, EGR, EFE and the secondary air injection systems - determine necessary action
   - Inspect the fuel tank, cap, lines, fittings and hoses - determine necessary action

4. **Diagnose engine performance complaints**

   **Learning Objectives**
   - Interpret and verify customer complaint - determine necessary action
   - Locate and interpret vehicle and major component identification numbers (VIN, certification and calibration labels)
   - Diagnose no start, drivability and emission concerns on engines with distributor ignition, DIS and COP ignition
   - Diagnose the cause of unusual engine noise or vibration - determine necessary action
   - Diagnose engine support system problems with an oscilloscope, engine analyzer and a digital multimeter
   - Diagnose unusual exhaust color, odor, and sound - determine necessary action

5. **Demonstrate engine repair and maintenance**

   **Learning Objectives**
   - Replace spark plugs, fuel filter and air filter
   - Check and adjust ignition timing and timing advance
   - Check and adjust idle speed and mixture when applicable
   - Adjust valves on engines with mechanical or hydraulic lifters when required
   - Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.
   - Perform engine oil and filter change.

**SCC Accessibility Statement**

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Additional information and forms can be found at: [www.southcentral.edu/disability](http://www.southcentral.edu/disability)

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