



South Central College

# AST 1714 Introduction to Engine Operation

## Common Course Outline

### Course Information

**Description** This course covers the theory of operation, basic diagnosis, and maintenance of the automotive gasoline engine, fuel system, ignition system, and emission system. Prior knowledge gained by the successful completion of AST1212 is recommended for student success in this course. (Prerequisite: Admission to the Automotive Service program)

**Total Credits** 2

**Total Hours** 48

### Types of Instruction

Instruction Type	Credits/Hours
Lecture	1/16
Lab	1/32

### Pre/Corequisites

Admission to 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 Outcomes

#### 1. Exhibit professionalism and demonstrate proper shop safety procedures

##### Learning Objectives

Demonstrate professional conduct 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 operation including engine mechanical, fuel and ignition systems, engine cooling system,

exhaust system, and emission system

Locate and interpret vehicle and major component identification numbers (VIN, certification, and calibration labels)

### **3. Demonstrate inspection and testing procedures**

#### **Learning Objectives**

Inspect the engine for fuel, oil, coolant, or other leaks; inspect the condition of all auxiliary coolers - 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 and electric fans, fan clutch, fan shroud, air dam, and fan control devices - determine necessary action

Inspect the integrity of the exhaust manifold(s), exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe, and heat shield(s) - perform necessary action

Perform an exhaust system backpressure test, and conduct a cylinder power balance test - determine necessary action

Perform an engine absolute (vacuum/boost) intake manifold pressure test, perform engine cranking vacuum, idle and snap throttle vacuum test, test the operation of turbocharger or supercharger system

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 spark plugs, distributor, cap and rotor, ignition coil(s), ignition secondary wires or boots, and the positive crankcase ventilation (PCV) system - determine necessary action

Inspect the air filter, fuel filter, fuel tank, filler cap, lines, and fittings

Identify hybrid vehicle internal combustion engine service precautions

### **4. Diagnose engine performance concerns**

#### **Learning Objectives**

Interpret and verify customer concern, check for stored diagnostic trouble codes, check for service bulletins - determine necessary action

Diagnose no start, drivability, and emission concerns on engines with distributor ignition, distributorless ignition systems (DIS), and coil on plug (COP) ignition

Diagnose the cause of unusual engine noise or vibration

Diagnose engine support system problems with an oscilloscope, engine analyzer, and a digital multimeter

Diagnose unusual exhaust color, odor, and sound

### **5. Demonstrate engine repair and maintenance**

#### **Learning Objectives**

Replace spark plugs, plug wires or boots, fuel filter, and air filter

Adjust valves on engines with mechanical or hydraulic lifters when required

Inspect, test, and service positive crankcase ventilation (PCV) system

Perform engine oil and filter change, reset oil change maintenance indicator

### **SCC Accessibility Statement**

Disability Services provides accommodations and other supports to students with permanent and temporary disabilities that affect their SCC experience. Disabilities may include mental health (anxiety, depression, PTSD), ADHD, learning disabilities, chronic health conditions (migraine, fibromyalgia), sensory disabilities, and temporary disabilities (broken arm, surgery). Common accommodations are extended test time, private room for testing, audiobooks, and sign language interpreter.

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