



South Central College

AST 2743 Fuel Systems II

Common Course Outline

Course Information

Description	This course covers fuel injection and emission systems used with gasoline engines. The course focuses on the operation, diagnosis, and repair of automotive fuel injection and emission systems. (Prerequisite: Admission to the Automotive Service program)
Total Credits	3
Total Hours	72

Types of Instruction

Instruction Type	Credits/Hours
Lecture	1.5/24
Lab	1.5/48

Pre/Corequisites

Prerequisite Admission to the Automotive Service program

Institutional Core Competencies

Communication - Students will be able to demonstrate appropriate and effective interactions with others to achieve their personal, academic, and professional objectives.

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

Exhibit professional conduct, act responsibly, and accept responsibility for the successful and timely completion of assignments

Identify and follow all shop operating and safety procedures

Explain and demonstrate fuel system safety procedures

2. Describe fuel injection and emission systems and explain the principles of operation of the various components

Learning Objectives

Explain engine operating conditions and air-fuel requirements

Describe fuel injection types and identify system components
Explain fuel pump operation, fuel pump control, and fuel pressure regulation
Explain closed loop operation and clear flood mode
Define HC, CO, NOx, O2, and CO2
Describe the purpose of the various emission systems including the catalytic converter, secondary air injection, exhaust gas recirculation, positive crankcase ventilation, and the evaporative emissions system
Explain the purpose and operation of the various emission system components
Describe five gas exhaust analysis and interpret the exhaust gas readings

3. Inspect electronic fuel injection and emission systems - determine necessary action

Learning Objectives

Access and use service information to perform step-by-step diagnostics
Inspect the air induction system, throttle body, intake manifold, and gaskets for air or vacuum leaks
Describe and perform a fuel injector balance test and perform a fuel injector cleaning procedure
Describe diagnosing a hot or cold no-start, hard starting, poor drivability, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, and emission problem on a fuel injected engine

4. Test electronic fuel injection and emission systems - determine necessary action

Learning Objectives

Inspect and test fuel injectors, analyze injector waveforms, and measure injector pulse width
Perform active test of actuators using a scan tool
Test fuel pump operation, fuel pump control system, and fuel pressure regulator operation

5. Diagnose electronic fuel injection and emission systems - determine necessary action

Learning Objectives

Diagnose a drivability or emission concern on a computerized engine management system with and without a stored diagnostic trouble code
Diagnose drivability and emission concerns caused by an emission control system, exhaust gas recirculation, evaporative, catalytic converter, secondary air injection, and positive crankcase ventilation system
Describe diagnosing a drivability and emission problem due to a failure in an interrelated system, e.g. automatic transmission, security system, non-original equipment accessories, etc.
Explain testing the operation of the turbocharger or supercharger
Verify the proper operation of the variable valve timing system

6. Repair or replace fuel injection and emission system components

Learning Objectives

Replace fuel system components including the fuel pump and fuel injectors
Replace engine management system components
Replace emission system components
Check and refill the diesel exhaust fluid