South Central College

AST 2723  Fuel Systems I

Course Outcome Summary

Course Information

<table>
<thead>
<tr>
<th>Description</th>
<th>This course covers the principles of operation of the various types of automotive fuel systems. Fuel system component identification, operation, and testing is included in this course. Gasoline fuel system diagnosis and repair will be emphasized. (Prerequisite: Admission to the Automotive Service program)</th>
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<tbody>
<tr>
<td>Total Credits</td>
<td>3</td>
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<tr>
<td>Total Hours</td>
<td>72</td>
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Types of Instruction

<table>
<thead>
<tr>
<th>Instruction Type</th>
<th>Credits/Hours</th>
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<tbody>
<tr>
<td>Lecture</td>
<td>1.5/24</td>
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<tr>
<td>Lab</td>
<td>1.5/48</td>
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Pre/Corequisites

Admission into 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

2. **Describe different types of fuel**

   Learning Objectives
   - Describe the different types of fuels used in an internal combustion engine
3. **Explain the operation of the various fuel systems**

   **Learning Objectives**
   - Identify and describe the various types of fuel injection systems
   - Identify fuel injection system components and explain the operation of the each component
   - Explain the operation of the electric fuel pump and the gasoline direct injection high pressure mechanical fuel pump
   - Explain the intake air induction system operation

4. **Test the fuel system - determine necessary action**

   **Learning Objectives**
   - Explain and demonstrate engine vacuum testing and vacuum leak detection methods
   - Inspect throttle body and the intake manifold gasket for vacuum leaks and/or unmetered air entering the engine
   - Inspect and test the fuel pressure, pump volume, pump electrical circuit, pressure regulator, and pump control components
   - Inspect and test vacuum operated components and electrical components including connections and controls
   - Inspect and test idle speed control system components, wiring, and verify proper idle control operation
   - Inspect and test the intake air system components, inspect the intake air system duct-work for leaks

5. **Evaluate the fuel system - determine necessary action**

   **Learning Objectives**
   - Use bi-directional control to test the operation of fuel system components
   - Measure fuel injector resistance and perform a fuel injector balance test
   - Use a graphing meter or digital storage oscilloscope to graph the fuel injector and fuel pump waveforms
   - Analyze cold and warm engine performance problems, use a scan tool to check for stored diagnostic trouble codes

6. **Diagnose the fuel system - determine necessary action**

   **Learning Objectives**
   - Diagnose idle concerns, including stalling, unstable idle, and elevated emissions on fuel injected engines
   - Diagnose no-start or hard starting problems on fuel injected engines
   - Diagnose drivability concerns, misfire, hesitation, surging, power loss, spark knock, poor mileage, and emission problems on fuel injected engines

7. **Inspect, repair, or replace fuel system components**

   **Learning Objectives**
   - Check fuel for contamination, alcohol content, and quality
   - Replace the fuel pump and fuel filter
   - Inspect, test, and/or replace the fuel injectors
   - Inspect and/or replace fuel injection system electrical connectors and terminals
   - Inspect air filter housing, duct-work, and replace the air filter

**SCC Accessibility Statement**

South Central College strives to make all learning experiences as accessible as possible. If you have a disability and need accommodations for access to this class, contact the Academic Support Center to request and discuss accommodations. North Mankato: Room B-132, (507) 389-7222; Faribault: Room A-116, (507) 332-5847.

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

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