



South Central College

# AST 2733 Introduction to Automotive Computers

## Common Course Outline

### Course Information

<b>Description</b>	This course covers the operating principles and testing of automotive computers, sensors, and control devices. (Prerequisite: Admission to the Automotive Service program)
<b>Total Credits</b>	3
<b>Total Hours</b>	72

### Types of Instruction

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

### Pre/Corequisites

Prerequisite 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 safety procedures

Practice recommended precautions when handling static sensitive devices, read and interpret service information, technical service bulletins, and warnings

#### 2. Identify and describe the operation of automotive computer systems, circuits, and components

##### Learning Objectives

Identify computer system components and explain computer purpose, operation, memory, EEPROM, setup, and reprogramming/flashing

Identify and describe computer system inputs and explain input circuit operation  
Identify and describe computer system outputs and explain computer controlled output circuit operation  
Explain computer system diagnostics, system monitors, and fault codes  
Describe scan tool operation and scan tool diagnostics, obtain and interpret scan tool data  
Explain permanent magnet, Hall effect, and magneto-resistive sensor operation  
Explain oxygen sensor, throttle position, manifold absolute pressure, coolant temperature, intake air temperature, vehicle speed, detonation, and mass air flow sensor operation  
Contrast on-board diagnostics (OBD-I) and (OBD-II) and describe the use of OBD monitors for repair verification  
Explain open and closed loop operation

**3. Inspect automotive computer systems, circuits, and components - determine necessary action**

**Learning Objectives**

Retrieve and evaluate stored diagnostic trouble codes, freeze frame data, and OBD II monitor status  
Use service information to perform step-by-step troubleshooting of computer controlled systems, use scan tool to perform active test of actuators and components  
Inspect oxygen sensors, exhaust gas recirculation control, throttle position sensor, manifold absolute pressure sensor, and engine speed sensor  
Inspect reference voltage circuits, vehicle speed sensor, detonation sensor, switch type inputs, coolant sensor, intake air sensor, mass airflow sensor, and torque converter clutch operation

**4. Test automotive computer systems, circuits, and components - determine necessary action**

**Learning Objectives**

Test power, ground, and reference voltage circuits including connections and terminals  
Test oxygen sensors, exhaust recirculation control, throttle position sensor, manifold absolute pressure sensor, and engine speed sensor  
Test vehicle speed sensor, detonation sensor, switch type inputs, coolant sensor, intake air sensor, mass airflow sensor, and torque converter clutch operation  
Test computer inputs, outputs, and evaluate computer module operation by using a scan tool, graphing parameter identifiers, and a digital storage oscilloscope

**5. Diagnose and repair automotive computer systems, circuits, and components - determine necessary action**

**Learning Objectives**

Diagnose the cause of emission and drivability concerns due to the failure of computer controls with and without stored diagnostic trouble codes  
Evaluate body control modules and electronic circuits using a scan tool  
Diagnose the cause of false, intermittent, or incorrect operation of the anti-theft system  
Replace the computer and system components, including module setup, coding, and programming the computer  
Perform software transfers, software updates, or flash reprogramming of electronic modules  
Evaluate computer operation including drivability and emission problems resulting from malfunctions of interrelated systems