ACADEMIC AFFAIRS

Course Number: _____AUTO 214_____ **Department:** __AUTOMOTIVE TECHNOLOGY___
Course Title: ___ADVANCED CONTROL SYSTEMS__ **Semester:** ___SPRING__ Year __2009___

Objectives/Competencies

Course Objective	Competencies
(The student should develop and understanding of:)	**(The student must be able to:)**
1. Automotive computer system fundamentals by making a comparison to the human body's nervous system.	A. Explain how the human nervous system resembles a computer sensor input circuit.
	B. Compare the human brain processing ability to computer processing ability.
	C. Relate human reflex action to a computer actuator output circuit.
	D. List the five sensor categories of input classification.
	E. List the five actuator categories of output classification.
	F. Recognize different names reference manuals may use referring to computers.
	G. List several advantages computers provide that increase drive comfort, safety, convenience, and diagnosis.

Course Objective	**Competencies**
2. Computer system action, including the three stages of computer operation used in a typical automotive application.	A. Draw a computer block diagram showing HOM sensor actuators and computer interact.
	B. Read electrical/electronic schematics of control system circuits.
	C. List all sensors for any given application.
	D. Identify which category each sensor is classified in.
	E. List all actuators for any given application.
	F. Identify which category each actuator is classified in.
3. Number, type and location of computers will vary	A. Locate and interpret a block diagram for a vehicle's instrumentation computer.
	B. Locate and interpret a block diagram for a vehicle's anti-lock brake computers.
	C. Locate and interpret a block diagram for a vehicle's ignition computer.
	D. Locate and interpret a block diagram for a vehicle's engine computer.
	E. Locate and interpret a block diagram for a vehicle's suspension and steering system computer.

Course Objective	Competencies
3. continued.	F. Locate and interpret a block diagram for a vehicle's climate control computer.
	G. Locate and identify why power modules are sometimes used in conjunction with any of the above computers.
4. Computer sensor operation to aid in determining if a sensor signal is within the normal operation range or if it is not working properly.	A. Determine the location of any sensor in questions using reference material.
	B. Differentiate between active and passive sensors.
	C. Define the term V.Ref and explain how it in generated.
	D. Differentiate between V.Ref and signal terminals on two wire sensors.
	E. Differentiate between V.Ref, signal and signal return terminals on three wire sensors.
	F. Determine if the sensor generates and analog or digital signal.
	G. Define the term open loop operation.
	H. Define the term closed loop operation.
	I. Measure volts and resistance using a D.V.O.M. to determine if a sensor or associated circuit has failed.

Course Objective	**Competencies**

5. Computer actuator operation to aid in determining the cause of a faulty actuator circuit, including associated wiring and/or computer.

A. Explain what device provides power (BAT POS) to a typical actuator circuit.

B. Explain what device provides the ground to a typical actuator circuit.

C. Define the term groundside switching.

D. Identify the coil side and load side of a typical relay.

E. Take appropriate measurements using a D.V.O.M. to determine if a relay has failed.

F. Explain the operation of a solenoid.

G. Take appropriate measurements of a solenoid and determine the condition.

H. Take appropriate measurements of a D<C< motor and determine the condition.

I. Measure specific computer circuits and determine if associated wiring, computer or actuator is at fault.

6. The major components of a computer and recognize the function of each component, collectively providing decision-making commands.

A. Name the ten major parts of a typical computer.

B. Define the purpose of a voltage regulator.

C. Explain what function amplifiers provide for some sensors.

__Course Objective__	__Competencies__

6. continued.

    D. Describe what is the function of conditions.

    E. Explain why the microprocessor is called the brain of the computer.

    F. List the four types of memory in a computer.

    G. Determine which device produces constant pulse rate, which coordinates events in a computer.

    H. Explain how output drivers provide current to operate actuators.

7. The diagnostic process developed to convert the customer's concern into customer satisfaction.

    A. Routinely practice the eight-step diagnostic procedure for all computer-related concerns.

    B. List the eight-step diagnostic procedure.

    C. Verify the concern.

    D. Perform a thorough visual inspection and basic tests.

    E. Retrieve the diagnostic trouble codes.

    F. Check for technical service bulletins (T.S.B.'s)

    G. Look at scan tool data.

    H. Narrow the problem to a system or cylinder.

    I. Repair the problem and determine the root cause.

__Course Objective__	__Competencies__
7. continued.	J. Verify the repair and clear any stored diagnostic trouble codes.
8. Diagnostic trouble code retrieval with on-board diagnostic II (OBD II) vehicles.	A. Perform retrieve/clear continuous memory codes on OBD II vehicles using a scan tool.
	B. Perform a key on engine off self-test on OBD II vehicles using a scan tool.
	C. Perform a key on engine running on ODB II vehicles using a scan tool.
	D. Perform a system readiness test using a scan tool.
	E. Display freeze frame date using the scan tool on ODB II vehicles.
9. Accurate five gas exhaust analysis as a diagnostic tool for determining engine and emission system condition.	A. Identify the reasons why excessive amounts of HC, CO and Nox exhaust emissions are created.
	B. Describe how to base line a vehicle after an exhaust Emission failure.
	C. List acceptable levels of HC, CO, CO_2 and O_2 with and without a catalytic converter.
	D. List four possible causes for high readings for HC, CO and Nox.
	E. Describe how an exhaust system leak can cause O_2 readings to be high – indicating a lean running engine.

Course Objective	**Competencies**
9. continued.	F. Explain what effects carbon deposits in the combustion chamber have on emissions. G. Define I.M.240. I. List the steps required to perform a combustion chamber carbon cleaning procedure without disassembling the engine.

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