



COURSE OUTLINE

Course Number
AUT111

Course Title
Automotive Service Fundamentals

Credits
5

Hours:
lecture/Lab/Other
2 6

Co- or Pre-requisite
AUT 110

Implementation
Fall 2008

Catalog description (2006-2009 Catalog):

Introduction to the automobile and its operating systems. Emphasizes theories of operation of automobile systems, service repair facility procedures and current servicing procedures for automobile systems, with detailed attention given to diagnosis and repair of individual systems studied. Shop safety and procedures are emphasized through the duration of the course for use in all automotive related courses and service repair facility employment.

Is course New, Revised, or Modified? Revised

Required texts/other materials: Duffy, James E. **Modern Automotive Technology**, Goodheart-Wilcox, Inc., 2009

Revision date:
December 2008

Course coordinator: Fred Bassini, Ext. 3776, bassinif@mccc.edu

Information resources: Chrysler DealerConnect web-site, Chrysler Academy Training Reference Books, Service Manuals, On-line and CD Disc Self-study Courses and the AllData Online Service Information Database.

Other learning resources: ASE Study Guides, Automotive Related Articles Obtained From Magazines and Journals

Course Competencies/Goals:

The student will be able to:

- demonstrate his/her ability to perform automotive service and repair following protocol that promotes personal safety and the safety of others working in the repair facility or auto shop.
- explain the use of basic hand tools and be able to use basic hand tools to perform service and repair of automotive systems. This includes fastener thread repair.
- explain the fundamental theories of operation of automobile lubrication systems, liquid cooling systems, electronic fuel delivery systems, and electronic ignition systems.
- analyze engine cooling system, fuel system, ignition system, and lubrication system malfunctions and follow diagnostic procedures that result in the resolution of the malfunction.
 - Use diagnostic scan tools to verify proper operation of system components and identify components that are not operating within normal parameters.
 - Utilize printed and electronic service information to obtain guidance before beginning the diagnosis and/or repair of automobile systems.
 - Communicate with automotive repair professionals in a manner that follows standards of the automotive repair industry.

Course-specific General Education Knowledge Goals and Core Skills.

General Education Knowledge Goals

Goal 1. Communication. Students will communicate effectively in both speech and writing.

Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.

Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

Goal 5. History. Students will understand historical events and movements in World, Western, non-Western or American societies and assess their subsequent significance.

Goal 6. Diversity. Students will understand the importance of a global perspective and culturally diverse peoples.

Goal 7. Ethical Reasoning and Action. Students will understand ethical issues and situations.

MCCC Core Skills

Goal A. Written and Oral Communication in English. Students will communicate effectively in speech and writing, and demonstrate proficiency in reading.

Goal B. Critical Thinking and Problem-solving. Students will use critical thinking and problem solving skills in analyzing information.

Goal C. Ethical Decision-Making. Students will recognize, analyze and assess ethical issues and situations.

Goal D. Information Literacy. Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.

Goal E. Computer Literacy. Students will use computers to access, analyze or present information, solve problems, and communicate with others.

Goal F. Collaboration and Cooperation. Students will develop the interpersonal skills required for effective performance in group situations.

Goal G. Intra-Cultural and Inter-Cultural Responsibility. Students will demonstrate an awareness of the responsibilities of intelligent citizenship in a diverse and pluralistic society, and will demonstrate cultural, global, and environmental awareness.

Units of study in detail.

Unit I: SHOP AND EQUIPMENT SAFETY

Learning Objectives

The student will be able to...

- explain proper shop safety procedures when using shop equipment such as hydraulic equipment, power tools, and hand tools.
- demonstrate the proper way to safely hoist a vehicle on a twin-post vehicle lift and drive-on vehicle lift.

- locate, identify, and operate common auto shop safety devices such as fire extinguishers, fire blankets, first aid kits, electrical power safety interrupt switches, fire alarms, emergency exits, and automotive exhaust ventilation systems.

- A. IMPROTANCE OF SHOP SAFETY
 - a. Everyone's Responsibility/Think Safety
 - b. Safety Glasses/Eye Protection
 - c. Cleanliness
 - d. Clothing
- B. KNOW THE LAYOUT OF THE AUTO SHOP
 - a. Electrical Power Interrupt (Kill-Buttons) Switches
 - b. Fire Extinguishers
 - c. First Aid Kits
 - d. Fire Blankets
 - e. Fire Drill Procedures
- C. WHAT TO DO IF AN ACCIDENT OCCURS
 - a. Student
 - b. Instructor / TA
- D. RUNNING AN ENGINE IN THE SHOP
 - a. Carbon Monoxide
 - b. Exhaust Hoses
 - c. Shop Exhaust System
- E. FIRE PREVENTION
 - a. Fire/Fire Extinguisher Classification
 - b. Handling Flammables
 - c. Handling Oily Rags/Spontaneous Combustion
- F. ASBESTOS BRAKE DUST
 - a. Hazards/Handling/Removal Procedures
- G. COMPRESSED AIR
 - a. Eye and Ear Damage
 - b. Safety When Using Quick Disconnect Air Tool Fittings
- H. USING WORK LIGHTS (TROUBLE LIGHTS)
 - a. Heat Emitted From Light
 - b. Change of Starting a Fire
- I. USING HAND TOOLS
 - a. Cleanliness
 - b. Proper Handling
 - c. Maintenance
 - d. Using the Correct Tool For the Job
- J. USING POWER TOOLS
 - a. Electric or Compressed Air
 - b. Safety Guards
- K. USING HAYDRAULIC JACKS AND LIFTS
 - a. Vehicle Lifting Areas
 - b. Jack Stands
 - c. Equipment Safety Locks
- L. HANDLING AND STORAGE OF AUTOMOTIVE BATTERIES
 - a. Explosion Hazards
 - b. Acid and Handling
 - c. Jump-Starting Procedures
- M. SUPPLEMENTAL RESTRAINT SYSTEMS (SRS)
 - a. Disabling SRS systems
 - b. Precautions/Handling/Storage

- N. EMPLOYEE AND STUDENT RIGHT-TO-KNOW
 - a. OSHA Regulations
 - b. Material Safety Data Sheets (MSDA)

Unit II BASIC HAND TOOLS AND USAGE

Learning Objectives

The student will be able to...

- demonstrate their ability to adhere to safety procedures while using or working around hand tools
- explain which tool should be used for a specific service or repair process/describe the uses of basic hand tools
- analyze basic hand tools to determine if they are damaged or worn and must be removed from service to prevent injury and damage to automotive components.

A. IMPORTANCE OF USING THE PROPER TOOL FOR THE JOB

- a. Efficiency and Safety
- b. Metric or Standard

B. HAND TOOLS

- a. Any tool that is powered by the human hand

C. WRENCHES

- a. Open-End
- b. Box-End
- c. Combination
- d. Socket/Drives and Attachments
 - i. Six and Twelve Point
 - ii. Drive Sizes
 - iii. Types of Sockets
 - iv. Extensions
 - v. Universals/Swivels
- e. Torque Wrenches
 - i. Types
 - ii. Care and Handling
 - iii. Calibration
- f. Adjustable Wrench
- g. Allen (Hex) Wrenches
- h. Torx Tip Drive Tools

D. SCREW DRIVERS

- a. Common or Straight
- b. Phillips
- c. Special Purpose
- d. Proper Selection

E. PLIERS

- a. Slip-Joint
- b. Diagonal Cutting
- c. Needle-Nose
- d. Special Purpose
- e. Locking

F. HAMMERS

- a. Safety and Handling
- b. Types
 - i. Ball-Peen
 - ii. Dead-Blow

- iii. Sledge
 - iv. Carpenter's
 - v. Special Purpose
- G. PUNCHES AND CHISELS
 - a. Proper Selection
 - b. Types
 - c. Safety and Maintenance
- H. FILES
 - a. Usage
 - b. Handling Procedures
 - c. Types
- I. HACKSAWS
 - a. Proper Usage
 - b. Blade Selection and Blade Service
- J. TWIST DRILLS
 - a. Proper Method of Drilling
 - b. Left-Hand and Right-Hand Drill Bits
 - c. Drill and Drill Bit Maintenance
- K. SHOP POWER TOOLS
 - a. Hand Drill/Drill Press
 - b. Grinder/Wire Wheel
 - i. Stone Maintenance
 - ii. Wire Wheel Quality
 - iii. Material Selection
 - c. Air Wrenches/Impact Guns
 - d. Air Chisels
 - e. Cut-Off Tools
 - f. Proper Usage

Unit III FASTENERS AND THREAD REPAIR

Learning Objectives

The student will be able to...

- analyze fasteners and determine the fastener's size and thread design.
- explain what fasteners should be used for various applications and determine what grade fastener should be used in different applications.
- demonstrate the most efficient way to remove a broken or seized fastener and be able to demonstrate the proper way to repair damaged fastener threads.

A. TYPES OF THREADED FASTENERS

- a. Screws
 - i. Cap
 - ii. Machine
 - iii. Allen Head
 - iv. Self-Tapping
- b. Bolts
 - i. Cap
 - ii. Machine
 - iii. Square Head
 - iv. Carriage
- c. Studs
- d. Nuts
 - i. Hexagonal

- ii. Square
 - iii. Lock Nut
 - iv. Castellated
 - e. Washers
 - i. Flat
 - ii. Locking – Split, Star
- B. THREAD SIZES AND DESIGNATIONS
 - a. English System Threads
 - i. NC – National Course, NF – National Fine
 - ii. Fastener Diameter
 - iii. Fastener Length
 - b. Metric System Threads
 - i. Fastener Diameter – Metric Management
 - ii. Pitch in Millimeters
 - c. Using a Pitch Gauge
 - d. Grade Markings
 - i. English
 - ii. Metric
- C. EXTRACTING BROKEN FASTENERS
 - a. Left-Handed Drills
 - b. Heat
 - c. Penetrating Lubricant
 - d. Extractors
- D. REPAIRING DAMAGED THREADS
 - a. Tap/Die Usage
 - b. Thread Repair Inserts
 - c. Thread Chasers
- E. NON-THREADED FASTENERS
 - a. Dowel Pins: Straight, Tapered, Split
 - b. Retaining Rings (Snap Rings)
 - c. Keys
 - d. Splines
 - e. Rivets
 - f. Glue/Adhesive/Zip-Ties

Unit IV UNDER HOOD/UNDER CAR INSPECTION

Learning Objectives

The student will be able to...

- utilize printed and electronic automotive service information to access data related to specifications and service procedures.
- demonstrate his/her ability to locate safety and functionality concerns found during routine vehicle maintenance.
- provide recommendations to customers regarding needed vehicle repairs and service found necessary during a safety inspection.

- A. VEHICLE IDENTIFICATION PROCEDURES
 - a. Understanding the Vehicle Identification Number (VIN)
 - b. Using a Vehicle Service Manual (Printed and Electronic Manuals)
- B. UNDER HOOD INSPECTIONS
 - a. Purpose
 - b. Components
 - i. Fluid Levels
 - 1. Engine Oil

2. Automatic Transmission (Early and Some Late Model)
 3. Power Steering
 4. Coolant
 5. Brake Master Cylinder
 6. Clutch Master Cylinder
 7. Battery Water Level (If Applicable)
 8. Windshield Washer
 - ii. Accessory Drive Belts – Condition and Tension
 - iii. Condition of Hoses – Vacuum and Coolant
 - iv. Loose or Worn Components
- C. UNDER CAR INSPECTION
- a. Identifying Fluid Leaks
 - i. Fluid Colors
 - ii. Dyes and Additives
 - iii. Ultra-Violet Light Inspection
 - b. Fluid Levels
 - i. Manual Transmission and Transfer Case
 - ii. Automatic Transmission (Some Late Model)
 - iii. Differential (Front and Rear)
 - c. Areas for Fluid Leaks
 - i. Lower Engine
 - ii. Transmission
 - iii. Axle – Differential or Transaxle Seal
 - iv. Rack and Pinion Unit
 - v. Shock Absorbers
 - vi. Fuel Lines, Filter, Tank, and Pump
 - vii. Brake Lines
 - d. Other Inspection Components
 - i. Tires
 - ii. Steering System Linkages
 - iii. Suspension Components
 - iv. Universal Joints
 - v. Constant Velocity Joints
 - vi. Exhaust System
 - vii. Under Body – Floor Panels, Body Mounts, ect.

Unit V INTRODUCTION TO AUTOMOTIVE REPAIR FACILITIES

Learning Objectives

The student will be able to...

- demonstrate the proper way to document diagnostics and service repair procedure on repair orders.
- locate appropriate diagnostic and repair procedures using printed and electronic vehicle service information.
- explain the purpose and general operation of most for-profit automotive repair departments.

- A. PERFORMANCE STANDARDS
 - a. Service Department Standards
 - b. Technician Performance Standards
- B. SERVICE INFORMATION
 - a. Service Manuals
 - i. Special Tools
 - ii. Diagnostic Procedures Manuals
 - iii. Technical Service Bulletins (TSB's)
 - iv. Special Service Messages (SSM's)
 - v. Recall Notices
 - b. Diagnostic Tools

- i. Manufacturer-Specific Scan Tools
 - ii. Generic Scan Tools
 - iii. Service Publications (Printed and Electronic)
 - iv. DealerConnect (Chrysler)
 - v. AllData (Comprehensive)
- C. TROUBLESHOOTING
 - a. Six Step Troubleshooting Procedure
 - b. Diagnostic Trouble Codes (DTC's)
 - c. Where to Find technical Assistance
- D. LABOR OPERATIONS AND REPAIR ORDERS
 - a. Repair Order (R.O.) Formatting
 - b. Failure Codes
 - c. Labor Operations/Time Schedule/Technician Flat-Rate Compensation
 - d. Warranty Coverage and Warranty Procedures
- E. CUSTOMER SATISFACTION
 - a. Customer Satisfaction Index (CSI)
 - b. Customer Arbitration Boards
 - c. Lemon Laws
- F. TECHNICAL TRAINING
 - a. Chrysler Academy Training Requirements (CAP)
 - b. Computer-Based Training (CBT)
 - c. Comprehensive-Track Supplemental Training requirements
 - d. Automotive Service Excellence (ASE) Testing and Certification

Unit VI NEW AND USED VEHICLE PREPARATION PROCEDURES

Learning Objectives

The student will be able to...

- demonstrate their ability to accurately perform safety and functionality inspections of new and used automotive systems and components prior to customer taking delivery of the vehicle.
- follow warranty procedures to resolve issues found during new vehicle preparation.
- analyze a used vehicle to evaluate repairs and/or services that are needed before the vehicle is sold to a customer.

- A. THE IMPORTANCE OF A CAREFUL NEW AND USED VEHICLE PREPARATION
 - a. Customer Safety
 - b. Customer Satisfaction
- B. UNDER HOOD CHECKS
 - a. Hood Latch and Safety Latch Adjustments
 - b. Engine Oil Level
 - c. Automatic Transmission Fluid Level
 - d. Brake and Clutch Master Cylinder Fluid Level
 - e. Power Steering Fluid Level
 - f. Windshield Washer Fluid Level
 - g. Coolant Level
 - h. Fluid Lines and Connections
 - i. Electrical Wiring Connections and Routing
 - j. Battery Condition and Battery Terminal Cable Connections
 - k. Accessory drive belt(s) and Hoses Condition (Used Vehicle)
- C. BODY CHECKS
 - a. Exterior Lighting
 - b. Check Operation and Alignment of Components
 - i. Adjustments

- c. Door and Window Sealing
- d. Operation of Interior Accessories
- e. Wiper Blade Condition (Front and Rear) (Used Vehicle)
- f. Seat Adjusters and Latches
- g. Occupant Restraints and Head Restraints
- h. Paint Touch-Up Techniques
 - i. Paint
 - ii. Blending
- D. UNDER VEHICLE
 - a. Check For Loose Components and Installation of Cotter Pins
 - b. Differential Fluid Levels
 - c. Manual Transmission and Transfer Case Fluid Levels
 - d. Fluid Lines, Hoses, and Connections
 - e. Fluid Leaks
 - f. Exhaust System
 - g. Brake System Evaluation (Used Vehicle)
 - h. Worn Components (Used Vehicle)
- E. TIRES
 - a. Condition
 - b. Setting Tire Pressures
 - i. Calibrating Tire Pressure Monitoring Sensors (TPMS) (Where Applicable)
 - b. Lug Nut Torque
- F. INSTALLING ITEMS THAT WERE SHIPPED LOOSE
 - a. Floor Mats
 - b. Wheel Covers
 - c. Roof Rack Bars
 - f. Front License Plate Holders
- G. ROADTEST
 - a. Clutch or Neutral Start Switch Operation/Adjustment
 - b. Instrument Panel Cluster and Gauges
 - c. Instrument Panel Controls
 - d. Wipers and Washers (Front and Rear)
 - e. A/C, Heater, and Defroster Systems
 - f. Radio Operation Including CD Players, CD Changers, Navigation Systems, and Rear Entertainment Systems
 - g. Brake and Parking Brake Operation
 - i. Parking Brake Adjustment
 - h. Engine/Transmission Performance
 - l. Steering Control
 - j. Vibrations and Rattles/Noise Vibration and Harshness Concerns (NVH)
- H. CLEANING VEHICLE/APPEARANCE
 - a. Wash Off All Road Grime
 - b. Remove All Shipping Stickers
 - c. Clean All Glass
 - d. Remove All Excess Sealers, Undercoating, and Weatherstrip Adhesive
- I. NEW AND USED VEHICLE PREPARATION FORM
 - a. Documentation of Inspection Results
 - b. Technician Signature and Date of Inspection

Unit VII FUNDAMENTALS OF THE INTERNAL COMBUSTION ENGINE

Learning Objectives

The student will be able to...

- explain the 4-cycle theory
- explain the purpose and operation of internal engine components
- describe the difference between the combustion process that takes place in gasoline and diesel engines

A. INTERNAL AND EXTERNAL COMBUSTION

- a. Laws Governing Engine Combustion
 - i. Pascal's Law
 - ii. Boyle's Law
 - iii. Charles' Law
- b. Cannon Principle
 - i. Essential Components
 - ii. Reciprocating and Rotary Motion

B. FOUR-CYCLE THEORY

- a. Intake
 - i. Volumetric Efficiency
 - ii. Valve Overlap
- b. Compression
 - i. Combustion Temperature
 - ii. Temperature vs. Pressure
 1. Spontaneous Combustion
 2. Pressure Controlled by Chamber Design
- c. Power
 - i. Combustion Pressure
- d. Exhaust
 - i. Cylinder Pressure Exhaust Evacuation

C. ENGINE COMPONENTS

- a. Engine Block/Cylinders
 - i. Cylinder Configurations
 - ii. Construction
- b. Piston/Connecting Rod/Rings
- c. Crankshaft/Flywheel
- d. Cylinder Head
 - i. Chamber Designs
 - ii. Combustion Abnormalities
- e. Valve Train Components
 - i. Valves/Springs
 - ii. Camshaft
 - iii. Lifters/Push Rods/Rocker Arms
 - iv. Timing Belt or Chain
- f. Intake and Exhaust Manifolds

D. ENGINE SIZE AND PERFORMANCE MEASUREMENT

- a. Displacement
 - i. Bore and Stroke
 - ii. Compression Ratio
- b. Horsepower
- c. Torque

E. ENGINE CONDITION DIAGNOSIS

- a. Compression Test (Engine Cranking and Engine Running Test)
- b. Cylinder Leakage Test
- c. Vacuum Test
- d. Power Balance Test (Performed When Applicable With Scan Tool)

Unit VIII SYSTEM FUNDAMENTALS

Learning Objectives

The student will be able to...

- explain the function and operation of modern liquid cooling systems used in the design of late model automobiles.
- analyze the operation of liquid cooling systems and determine the root cause of system malfunctions.
- explain the importance of proper maintenance for engine cooling and lubrication systems.
- demonstrate his/her knowledge of automotive engine lubrication system by explaining how oil pressure is created and explain common failures that result in low engine oil pressure.

A. LUBRICATION/OILS

- a. Functions of Lubrication
 - i. Reduce Wear and Power Loss
 - ii. Cooling Through Heat Transfer
 - iii. Shock Absorption
 - iv. Sealing
 - v. Cleaning
- b. Characteristics of Lubricants
 - i. Cohesion
 - ii. Viscosity and Viscosity Index Rating – SAE
 - iii. Service Rating – API
 - iv. Qualities (Additives)
 - v. Deterioration
 - vi. Contamination
 - vii. Breakdown
 - viii. Polymerization
 - ix. Long-Interval Oils
 - x. Synthetic Oils
- c. System Components and Oil Flow
 - i. Oil Pan
 - ii. Oil Pump and Pick-Up
 - iii. Oil Filter and Adaptor
 - iv. Galleries and Passages
 - v. Oil Leak Diagnosis
 - vi. Oil Pressure Indicators
- d. Lubrication System Service
 - i. Oil Analysis
 - ii. Performing and Oil Filter Change
 - iii. Proper Disposal of Waste Oil
 - iv. Chassis Lubrication

B. COOLING/COOLANTS

- a. Introduction to Cooling
 - i. Air and Liquid Cooling Systems
- b. Coolant Properties
 - i. Proper Dilution of Concentrated Antifreeze
 - ii. Extended Life Coolant
 - iii. Ethylene-Glycol vs. Propylene-Glycol
- c. System Components
 - i. Water Pump

- ii. Thermostat
- iii. Hoses and Tubes
- iv. Radiator
 - 1. Pressure Cap
 - 2. Pan
 - 3. Coolant Recovery Bottle
- v. Temperature Monitoring System
- d. Cooling System Service
 - i. System Testing
 - ii. Component Check and Adjustments
 - iii. Coolant Exchange/Flushing Procedures
 - 1. Front Wheel Drive
 - 2. Rear Wheel Drive

C. FUEL/EMISSIONS CONTROL

- a. Introduction to Vehicle Emissions
- b. Fuel System Components
 - i. Fuel Characteristics
 - 1. Refining
 - 2. Octane Rating
 - 3. Volatility
 - 4. Additives
 - ii. Fuel Related Drivability Problems
 - 1. Fuel Tank/Cap
 - 2. Fuel Pump
 - 3. Fuel Filter and Service
- c. Carburetor or Throttle Body Injection
 - i. Functions and Basic Theory of Operation
 - ii. Service Procedures
 - iii. Multi-Point E.F.I.
 - iv. Sequential
 - v. Theory of Operation
 - vi. Air Cleaner
- d. Fuel System Troubleshooting
 - i. Visual Inspection
 - ii. Fuel Pump Tests
 - 1. E.F.I. Equipped Systems
 - iii. Separating Quick – Disconnect Fittings

D. IGNITION SYSTEMS

- a. Introduction to the Ignition System
 - i. Primary Ignition
 - ii. Secondary Ignition
- b. Point Ignition System
 - i. Operation and Construction
- c. Electronic Ignition System (EIS)
 - i. System Components
 - ii. Electronic Control Unit (ECU)
 - iii. Switching Device
- d. Ignition System Components
 - i. Ballast Resistor
 - ii. Ignition Coil
 - iii. Distributor Cap
 - iv. Secondary Wires
 - v. Spark Plugs

- e. Conventional Spark Advance
 - i. Centrifugal Spark Advance
 - ii. Vacuum Advance
 - iii. Computer Controlled Advance

Unit IX ELECTRONIC IGNITION SYSTEMS (EIS)

Learning Objectives

The student will be able to...

- explain electronic ignition system design and operation.
- analyze an electronic ignition system and determine the type electronic ignition system install on a vehicle.
- demonstrate his/her ability to diagnose and repair malfunctions in an electronic ignition system.
- explain the advantages of electronic ignition systems compared to mechanical ignition systems.

A. HALL EFFECT EIS

- a. System Description and Operation
- b. Shutter Continuity Check
- c. Scope Pattern
- d. System Diagnosis
 - i. Output Check
 - ii. Voltage Check
 - iii. Distributor Connector and ECU Continuity Check
 - iv. Hall Effect Pick-Up Check

B. ELECTRONIC SPARK CONTROL SYSTEMS

- a. Electronic Fuel Injection
 - i. Description/Operation/System Components
 - ii. Diagnostic Procedures
 - iii. Base Timing and Spark Advance Checks
- b. Photo Sensor – Optical Ignition System
 - i. Description/Operation/Components
 - ii. Diagnostic Procedures
 - iii. Component Service
- c. Distributor-Less Ignition System
 - i. Description/Operation/Components
 - ii. Diagnostic Procedures
 - iii. Component Service
- d. Direct Ignition System
 - i. Description/Operation/Components
 - ii. Diagnostic Procedures
 - iii. Component Service

C. USING SCAN TOOLS FOR IGNITION DIAGNOSIS

- a. Stand-Alone Scan Tool
- b. Scan Tool With Ignition System Testing Adaptors

Unit X INTRODUCTION TO DIAGNOSTIC SCAN TOOLS

Learning Objectives

The student will be able to...

- identify vehicle on-board-diagnostic system types.
- analyze data stream information via scan tool readings and determine possible sources of system malfunctions.

- demonstrate his/her ability to read and erase diagnostic trouble codes (DTC's) stored in vehicle control modules.

A. TYPES OF DIAGNOSTIC SCAN TOOL

- a. Manufacturer-Specific (Chrysler)
 - i. DRB II
 - ii. DRB III
 - iii. Star Scan
 - iv. Star Mobile
- b. Generic
 - i. Snap-on Ethos
 - ii. Snap-on Solis
 - iii. Others
 - iv. Stand-Alone Code Readers

B. ON-BOARD-DIAGNOSTIC

- a. OBDI
 - i. Lack of Comprehensive Component Monitors
 - ii. Detection of Failed Components Only
 - iii. No Detection of Failure Type
- b. OBDII
 - i. Addition of Comprehensive Component Monitors
 - ii. Detect Worn Components
 - iii. Detection of Failure Type
- c. Vehicle Communication Networking
 - i. Data Sharing
 - ii. Data Stream Information

C. CONNECTING THE SCAN TOOL TO THE VEHICLE

- a. Diagnostic Connectors
 - i. Location
 - 1. Each Manufacturers' Location
 - 2. Standardization of Location
 - ii. Data Link Connector (DLC)
- b. Scan Tool Cables
 - i. Specialized Diagnostic Connectors (OBDI)
 - ii. Standardized 16-Pin Diagnostic Connector (OBDII)
- c. Powering On the Scan Tool
 - i. On/Off Button
 - ii. Powered On When Connected to the Vehicle
- d. Checking For Codes (DTC's)
 - i. Reading DTC's
 - ii. Erasing DTC's
- e. Computer Diagnostics
 - i. Data Display
 - ii. Output Tests
 - iii. Wiggle Test
 - iv. Actuator Commands
 - v. Troubleshooter
 - vi. Program Cartridge
 - vii. Adaptors and Keys
- f. Failure Types
 - i. Hard Failure
 - ii. Soft Failure

- iii. General Circuit Failure
- iv. Low-Input Failure
- v. High-Input Failure
- vi. Improper Range/Performance Failure
- g. Diagnostic Trouble Code (DTC) Identification
 - i. Standardized Alpha-Numeric Trouble Codes
 - ii. Non-Uniform Trouble Codes
 - iii. Fault Designation
 - iv. Decoding DTC's

Unit XI COURSE REVIEW/FINAL EXAM

- A. SHOP AND EQUIPMENT SAFETY
- B. BASIC HAND TOOLS AND USAGE
- C. FASTENERS AND THREAD REPAIR
- D. UNDER HOOD/UNDER CAR INSPECTION
- E. INTRODUCTION TO AUTOMOTIVE REPAIR FACILITIES
- F. NEW AND USED VEHICLE PREPARATION PROCEDURES
- G. FUNDAMENTALS OF THE INTERNAL COMBUSTION ENGINE
- H. SYSTEM FUNDAMENTALS
 - a. Lubrication/Oils
 - b. Cooling/Coolant
 - c. Fuel and Emissions Control
 - d. Ignition Systems
- I. ELECTRONIC IGNITION SYSTEMS (EIS)
- J. INTRODUCTION TO DIAGNOSTIC SCAN TOOLS

Evaluation of student learning:

- | | |
|---|-----|
| A. Lab Work | 50% |
| B. Test/Quizzes/Homework Assignments/Final Exam | 50% |

Academic Integrity Statement:

Mercer County Community College is committed to Academic Integrity-- the honest, fair and continuing pursuit of knowledge, free from fraud or deception. This implies that students are expected to be responsible for their own work, and that faculty and academic support services staff members will take reasonable precautions to prevent the opportunity for academic dishonesty.

Reasonable Accommodations for Students with Documented Disabilities

Mercer County Community College is committed to supporting all students in their academic and co-curricular endeavors. Each semester, a significant number of students document disabilities, which may require learning, sight, hearing, manual, speech, or mobility accommodations to ensure access to academic and co-curricular activities. The college provides services and reasonable accommodations to all students who need and have a legal entitlement to such accommodations.

For more information regarding accommodations, you may visit the Office of Academic Support Services in FA129 or contact them at 609.570.3422 or urbanb@mccc.edu.