Canyons' CurricUNET — College of the Canyons

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	AUTO 105 Automatic Transmissions *Active* Gary Sornborger
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	AUTO 108 Engine Performance II *Launched* **Modified Course Proposal** Gary Sornborger
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	AUTO 109 Automotive Brake Systems *Launched* **Modified Course Proposal** Gary Sornborger

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COLLEGE OF THE CANYONS

AUTO 090 - Automotive Maintenance and Operation

Approval Date: Effective Term: Fall 2008

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 3.00
Grading Option: Letter Grade
Transferability: Not-Transferable
Course is: AA/AS Degree
Repeatability:
Contact Hours per Term:
Lecture/Discussion: *2.00*
Lab: *3.00*
Associate Degree GE Applicability: No
Recommended Class Size: 35

Discipline/Minimum Qualifications:

Auto Mechanics

Catalog Description:

Introduces automotive maintenance and repair concepts for the student with little or no background in the automotive field. Topics include: basic theory of operation, maintenance and minor repair of engine and other auto components as well as consumer education.

Schedule Description:

Introduces automotive maintenance and repair concepts for the student with little or no background in the automotive field.

Student Learning Outcome:

1. Perform minor repair and maintenance of basic automotive systems.
2. Differentiate between repair and maintenance issues that are minor and those that require attention from an automotive service professional.

Course Objectives:

1. Identify and explain the components and operation of various engine operating systems, i.e. lubrication system, cooling system, fuel system, lighting system, braking system, ignition system
2. Perform basic checks on engine component systems that are preventive maintenance

Course Content Outline:

1. Batteries
a. Operation
b. Testing
c. Servicing

2. Brakes
a. Types
b. Parts
c. Operation
d. Service

3. Cooling System
a. Inspection
b. Testing

c. Cleaning
d. Parts replacement
e. Coolant service
f. Troubleshooting

4. Exhaust Systems
a. Inspection
b. Muffler removal and installation
c. Tailpipe removal and installation

5. Filters
a. Air filter types
b. Servicing air filters
c. Gasoline filter types
d. Servicing gasoline types
e. Oil filter types
f. Servicing oil filters

6. Lighting Systems
a. Bulb and socket types
b. Servicing headlights
c. Interior and instrument
d. Fuses and circuit breakers
e. Turn signals and flasher system
f. Brake light switches

7. Lubrication
a. Equipment
b. Fittings
c. Front suspension and steering linkage service
d. Important service points
e. Engine
f. Servicing engine
g. Accessories

8. Exhaust Emission Control
a. Types of systems
b. Servicing

9. Shock Absorbers
a. Types
b. Replacement

10. Spark Plugs
a. Heat range causes of plug failure
b. Reach
c. Cleaning
d. Troubleshooting tips

11. Tires
a. Air pressure
b. Wear patterns
c. Balance
d. Rotation
e. Service
f. Special Tires
g. Repair

12. Transmissions and Differentials
a. Automatic transmissions
b. Manual transmissions

13. Universal joints
a. Types

b. Lubrication without fittings or plugs
c. Replacement

Methods of Instruction:

Lab , Lecture:

Methods of Evaluation:

Exams/Tests/Quizzes
Skill Demonstrations

Assignments

Typical Assignments:

Reading:
Text Vehicle service manual

Writing, Problem Solving or Performance:
Weekly lab report Written chapter reviews lab assignments

Other:

Required Materials Examples:

Book 1

Author: Renling, John and Patten, Donald Publication Date: 2002 Edition: 4th
Title:Automotive Service Basics Publisher: Prentice Hall

Course Preparation:

Prerequisite(s):	None
Co-Requisite(s):	None
Recommended:	None

COLLEGE OF THE CANYONS

AUTO 090 - Automotive Maintenance and Operation

Approval Date: Effective Term:

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 3.00
Grading Option: Letter Grade
Transferability: Not-Transferable
Course is: Credit Non-Degree
Repeatability: Not Repeatable
Contact Hours per Term:
Lecture/Discussion: *36.00*
Lab: *54.00*
Associate Degree GE Applicability: No
Recommended Class Size: 24
-Rationale: Safety requirement.

Discipline/Minimum Qualifications:

Auto Mechanics

Catalog Description:

Introduces an overview of automotive maintenance and repair concepts for the student with little or no background in the automotive field. Topics include: basic theory of operation, maintenance and minor repair of engine and other auto components as well as consumer education.

Schedule Description:

Introduces an overview of automotive maintenance and repair concepts for the student with little or no background in the automotive field

Student Learning Outcome:

1. Lab: Perform minor repair and maintenance of basic automotive systems.
2. Lecture: Identify and explain the components and operation of various engine operating systems, i.e. lubrication system, cooling system, fuel system, lighting system, braking system, ignition system.

Course Objectives:

Lecture

1. Lecture: Describe safety precautions taken when using various tools and equipment.
2. Lecture: Recognize battery sealed or serviceable voltage drops.
3. Lecture: Explain how to check for leaks in exhaust system.
4. Lecture: Describe how to inspect and change lights.
5. Lecture: Describe the different catalytic converters.
6. Lecture: Describe the procedure for cleaning the EGR valve.
7. Lecture: Describe basic computer controls.
8. lecture: Describe how to check tires for wear patterns.
9. Lecture: Compare and contrast automatic and manual transmissions.

Lab

1. Lab: Perform basic checks on engine component systems that are preventive maintenance
2. Lab: Differentiate between repair and maintenance issues that are minor and those that require attention from an automotive service professional.

3. Lab: Inspect brakes for wear of rear shoes, friction material, and leaks of brake fluid.
4. Lab: Inspect and test coolant voltage and specific gravity.
5. Lab: Change air filter.
6. Lab: Inspect running, head, and foot lights.
7. Lab: Perform oil change.
8. Lab: Inspect and replace rear shock absorbers.
9. Lab: Pull, inspect, and check heat range for spark plugs based upon requirements of Mitchel on Demand.
10. Lab: Check tire pressure and fill tires with nitrogen.
11. Lab: Inspect universal joints for wear.

Course Content Outline:

Lecture:

1. Safety and housekeeping
a. autoshop layout and general safety issues
b. types of common accidents
c. Tools and safety
d. Slip, trips, falls
e. tool cleanliness and tool box organization

2. Batteries
a. Operation
b. Servicing

3. Brakes
a. Types
b. Parts
c. Operation
d. Inspection

4. Cooling System
a. Inspection
b. Testing
c. Cleaning
d. Parts replacement
e. Coolant service

5. Exhaust Systems
a. Inspection
b. Muffler removal and installation
c. Tailpipe removal and installation

6. Filters
a. Air filter types
b. Servicing air filters
c. Gasoline filter types
d. Servicing gasoline types
e. Oil filter types
f. Servicing oil filters

7. Lighting Systems
a. Bulb and socket types
b. Servicing headlights
c. Interior and instrument
d. Fuses and circuit breakers
e. Turn signals and flasher system
f. Brake light switches

8. Lubrication
a. Equipment
b. Fittings
c. Front suspension and steering linkage service
d. Important service points
e. Engine

f. Servicing engine
g. Accessories

9. Exhaust Emission Control
a. Types of systems
b. Servicing and inspection

11. Shock Absorbers
a. Types
b. Replacement
c. McPhearson struts suspension

12. Spark Plugs
a. Heat range causes of plug failure
b. Reach
c. Cleaning
d. Troubleshooting tips

13. Tires
a. Air pressure
b. Wear patterns
c. Balance
d. Rotation
e. Service
f. Special Tires
g. Repair

14. Transmissions and Differentials
a. Automatic transmissions
b. Manual transmissions

15. Universal joints
a. Types
b. Lubrication without fittings or plugs
c. Replacement

Lab:

1. Batteries
a. Servicing

2. Brakes
a. Operation
b. Service and inspection

3. Cooling System
a. Inspection
b. Testing
c. Coolant service
d. Troubleshooting

4. Exhaust Systems
a. Inspection
b. Muffler removal and installation
c. Tailpipe removal and installation

5. Filters
a. Servicing air filters
b. Servicing gasoline types
c. Servicing oil filters

6. Lighting Systems
a. Servicing headlights
b. Fuses and circuit breakers
c. Turn signals and flasher system

d. Brake light switches

7. Lubrication
a. Equipment
b. Fittings
c. Front suspension and steering linkage service
d. Important service points
e. Engine
f. Servicing engine

8. Exhaust Emission Control
a. Servicing and inspection

9. Shock Absorbers
a. Replacement
b. McPhearson stuts suspension

10. Spark Plugs
a. Cleaning
b. Troubleshooting tips

11. Tires
a. Air pressure
b. Wear patterns
c. Rotation
d. Service
e. Special Tires
f. Repair

12. Transmissions and Differentials
a. Automatic transmissions inspection
b. Manual transmissions inspection

13. Universal joints
a. Lubrication without fittings or plugs
b. Replacement

Methods of Instruction:

Lab , Lecture:

Methods of Evaluation:

Exams/Tests/Quizzes
Skill Demonstrations

Typical Assignments:

Reading:

Text Vehicle service manual; inpection form

Writing, Problem Solving or Performance:

Lecture: Research applicable service information for various makes and models using Alldata and Mitchell-on-Demand.

Lab: Oil change assignment covers the many instructional activities. Students are evaluated on the various required components to sucessfully change a vehicle's oil including racking the vehicle, draining the oil, removing the filter, installing a new filter, and filling with new oil.

Other:

Required Materials Examples:

Book 1

Author: Duffy, James E	Publication Date: 2014	Edition: 8th
Title:Modern Automotive Technology	Publisher: Goodheart-Wilcox Company, Inc.	

Manual 1

Author: Johanson, Chris	Publication Date: 2005-01-01 00:00:00.0
Title:Modern Automotive Technology Shop Manual	Publisher: Goodheart-Wilcox Company, Inc.

Course Preparation:

Prerequisite(s):	None
Co-Requisite(s):	None
Recommended:	None

COLLEGE OF THE CANYONS

AUTO 094 - Automotive Heating and Air Conditioning

Approval Date: 02/07/2008 Effective Term: Fall 2008

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 3.00
Grading Option: Letter Grade
Transferability: Not-Transferable
Course is: AA/AS Degree
Repeatability:
Contact Hours per Term:
Lecture/Discussion: *27.00*
Lab: *81.00*
Associate Degree GE Applicability: No
Recommended Class Size: 35

Discipline/Minimum Qualifications:

Auto Mechanics

Catalog Description:

Provides theory and practical application of the function and repair of heating and air conditioning systems as applied to domestic and imported automobiles.

Schedule Description:

Provides theory and practical application of the function and repair of heating and air conditioning systems as applied to domestic and imported automobiles.

Student Learning Outcome:

1. Diagnose and repair air conditioning and heating systems in contemporary automobiles.

Course Objectives:

1. Assess the operation of a typical air conditioning system
2. Explain how a vehicle's air condition/heating system cools or heats the air, removes moisture and dust from the air, and circulates the air during operating cycle.
3. Interpret the natural laws relating to matter, solids, liquids, vapors, heat, and energy as they pertain to refrigeration systems.
4. Demonstrate the use of safety rules that apply to the handling, storage and dispensing of refrigerants.
5. Diagnose noises in the A/C compressor clutch and compressor and determine needed repairs.
6. Inspect and replace all components used in an air conditioning system.
7. Assess the function and operation of the sensors, cables, linkages, control valves and the amplifier; microprocessor; or programmer; used in automatic temperature controlled systems and determine needed repairs.
8. Compare and contrast the design differences between General Motors, Ford, Chrysler, and typical import air conditioning systems.
9. Remove and replace a compressor, accumulator/dryers, condensers, evaporators, and the thermostatic valve or orifice tube.
10. Diagnose failures in the operation of heater cores, flow control devices, air control doors, and electrical controls in heater and A/C systems.

Course Content Outline:

Lecture:
1. History and Purpose of Heating and Cooling Systems

a. Development of refrigeration

2. Health and Safety
a. The effects on the atmosphere and ozone
b. Shop safety and injuries from high pressure

3. Temperature and pressure fundamentals
a. Chemical compounds
b. Air conditioning circuits and components

4. The Refrigerant System
a. Diagnosis
b. Temperature and pressure relationship
c. Handling refrigerant

5. System components
a. Accumulators and receiver driers
b. Evaporators and condensers
c. Lines and hoses
d. Compressors and clutches

6. System servicing, testing and diagnosing
a. Diagnosis
b. Leak testing
c. Recovery systems
d. Charging the system

7. Case and duct system
a. Original equipment or after-market
b. Air distribution and delivery

8. Retrofit (CFC-12 to HFC-134a)
a. Replacement refrigerants
b. Retrofit components

9. System Controls
a. Fuses and circuit breakers
b. Pressure switches
c. Automatic temperature controls

10. Engine Cooling and Comfort Heating Systems
a. The cooling system
b. The heater system
c. Preventive maintenance

Lab:
1. The Manifold Gauge Set
a. Connecting a gauge set
b. Performance testing

2. Servicing the System
a. Diagnosis
b. Inspection and servicing

3. Servicing System Components
a. Refrigerant types
b. Replacing components
c. Servicing hoses and fittings

4. Compressors and clutches
a. Compressor identification
b. Replacing shaft seals
c. Servicing the compressor clutch

5. System Servicing and Testing

a. Performing a leak test
b. Refrigerant recovery
c. Evacuate an A/C system
d. Charging an A/C system

6. Case and Duct Systems
a. Component replacem ent
b. Blower motors
c. Evaporator core

7. Retrofit (CFC-12 to HFC-134a)
a. Recovery and evacuate system
b. Installing components necessary to retrofit a 134a system

8. Diagnosis and Service of System Controls
a. Testing vacuum switches and controls
b. Testing automatic temperature control systems

9. Diagnosis and Service of Engine Cooling and Comfort Heating
a. Troubleshooting the heater and cooling system
b. Thermostats
c. Fans, pulleys and belts
d. Radiators and pressure caps

Methods of Instruction:

Lab , Lecture:

Methods of Evaluation:

Exams/Tests/Quizzes
Skill Demonstrations

Assignments

Typical Assignments:

Reading:
Text Technical service bulletins related to cooling and heating issues

Writing, Problem Solving or Performance:
Diagnose the heating and air conditioning system for proper operation. Write a short essay that compares and contrasts domestic heating/cooling systems with import systems. Skills demonstration

Other:

Required Materials Examples:

Book 1

Author: Mark Schnubel | Publication Date: 2005 | Edition: 3rd

Title:Today's Technician, Automotive Heating & Air Conditioning | Publisher: Delmar

Book 2

Author: Russell Carrigan, John Eichelberger | Publication Date: 2006 | Edition: 1st

Title:TechOne: Automotive Heating Air Conditioning | Publisher: Delmar

Book 3

Author: Thomas Wesley Birch	Publication Date: 2005	Edition: 4th
Title:Automotive Heating and Air Conditioning	Publisher: Prentice Hall	

Course Preparation:

Prerequisite(s):	None
Co-Requisite(s):	None
Recommended:	AUTO 101

COLLEGE OF THE CANYONS

AUTO 094 - Automotive Heating and Air Conditioning

Approval Date: Effective Term:

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 3.00
Grading Option: Letter Grade
Transferability: Not-Transferable
Course is: AA/AS Degree
Repeatability: Not Repeatable
Contact Hours per Term:
Lecture/Discussion: *27.00*
Lab: *81.00*
Associate Degree GE Applicability: No
Recommended Class Size: 28
-Rationale: Safety requirement.

Discipline/Minimum Qualifications:

Auto Mechanics

Catalog Description:

Provides theory and practical application of the function and repair of heating and air conditioning systems as applied to domestic and imported automobiles.

Schedule Description:

Provides theory and practical application of the function and repair of heating and air conditioning systems as applied to domestic and imported automobiles.

Student Learning Outcome:

Lecture:

1. Diagnose and repair air conditioning and heating systems in contemporary automobiles.

Lab:

1. Describe the basic operation of automotive air conditioning, heating, and ventilation systems.

Course Objectives:

Lecture

1. Lecture: Explain how a vehicle's air condition/heating system cools or heats the air, removes moisture and dust from the air, and circulates the air during operating cycle.
2. Lecture: Interpret the natural laws relating to matter, solids, liquids, vapors, heat, and energy as they pertain to refrigeration systems.
3. Lecture: Describe safety precautions taken when using various tools and equipment.
4. Lecture: Evaluate the risks of over and under charging the A/C.
5. Lecture: Explain how to use the freon identification works.
6. Lecture: Analyze the different system controls including voltage drops, required voltage and system grounding.
7. Lecture: Describe how to locate freon leaks from inspection.
8. Lecture: Discuss how system components work together.

Lab

1. Lab: Demonstrate the use of safety rules that apply to the handling, storage and dispensing of refrigerants.
2. Lab: Assess the operation of a typical air conditioning system
3. Lab: Diagnose noises in the A/C compressor clutch and compressor and determine needed repairs.
4. Lab: Inspect and replace all components used in an air conditioning system.
5. Lab: Assess the function and operation of the sensors, cables, linkages, control valves and the amplifier; microprocessor; or programmer; used in automatic temperature controlled systems and determine needed repairs.
6. Lab: Remove and replace a compressor, accumulator/dryers, condensers, evaporators, and the thermostatic valve or orifice tube.
7. Lab: Diagnose failures in the operation of heater cores, flow control devices, air control doors, and electrical controls in heater and A/C systems.
8. Lab: Demonstrate how to properly disassemble the ducts, evaporator and heater case.
9. Lab: Properly charge the A/C given low and high flux and base gauge readings.
10. Lab: Connect to A/C recovery and charging station.
11. Lab: Retrofit A/C freon from CFC-12 to HFC-134a.
12. Lab: Install refrigerant oil to dispense into the system.

Course Content Outline:

Lecture:
1. History and Purpose of Heating and Cooling Systems
a. Development of refrigeration
b. R12 danger to ozone layer

2. Health and Safety
a. The effects on the atmosphere and ozone
b. Shop safety and injuries from high pressure
c. safety equipment and eye injuries
d. dangers and hazzards of working with freon

3. Temperature and pressure fundamentals
a. Chemical compounds
b. Air conditioning circuits and components
c. Engine performance related to properly functioning heating, ventalation, and air conditioning

4. The Refrigerant System
a. Diagnosis
b. Temperature and pressure relationship
c. Handling refrigerant
d. Proper use of refrigerant identifier
e. How to visually inspect parts to identify the problem

5. System components
a. Accumulators and receiver driers
b. Evaporators and condensers
c. Lines and hoses
d. Compressors and clutches
e. O rings

6. System servicing, testing and diagnosing
a. Diagnosis
b. Leak testing
c. Recovery systems
d. Charging the system
e. Freon identification

7. Case and duct system
a. Original equipment or after-market
b. Air distribution and delivery
c. Proper use of tools
d. Disassemble procedure

8. Retrofit (CFC-12 to HFC-134a)
a. Replacement refrigerants
b. Retrofit components

9. System Controls
a. Fuses and circuit breakers
b. Pressure switches
c. Automatic temperature controls
d. Rear evaporator systems
e. DVOM

10. Engine Cooling and Comfort Heating Systems
a. The cooling system
b. The heater system
c. Preventive maintenance
d. Cleaning and degreasing of AC condenser

Lab:
1. Safety and housekeeping
a. autoshop layout and general safety issues
b. types of common accidents
c. Tools and safety
d. Slip, trips, falls
e. tool cleanliness and tool box organization

2. The Manifold Gauge Set
a. Connecting a gauge set
b. Performance testing
c. AC freon recovery equipment
d. charging techniques for AC recovery and charging station

3. Servicing the System
a. Diagnosis
b. Inspection and servicing
c. Disassembly of AC parts and components

4. Servicing System Components
a. Refrigerant types
b. Replacing components
c. Servicing hoses and fittings
d. Recovering of AC freon

5. Compressors and clutches
a. Compressor identification
b. Replacing shaft seals
c. Servicing the compressor clutch
d. compressor diagnosis and worn belts

6. System Servicing and Testing
a. Performing a leak test
b. Refrigerant recovery
c. Evacuate an A/C system
d. Charging an A/C system
e. Freon dye and blocking to locate broken parts

7. Case and Duct Systems
a. Component replacement
b. Blower motors
c. Evaporator core

8. Retrofit (CFC-12 to HFC-134a)
a. Recovery and evacuate system
b. Installing components necessary to retrofit a 134a system
c. Flush, clean system

d. Replace acc and receiver dryer

9. Diagnosis and Service of System Controls
a. Testing vacuum switches and controls
b. Testing automatic temperature control systems
c. Use of smoke to diagnose vacuum line failures

10. Diagnosis and Service of Engine Cooling and Comfort Heating
a. Troubleshooting the heater and cooling system
b. Thermostats
c. Fans, pulleys and belts
d. Radiators and pressure caps
e. Computer control operation

Methods of Instruction:

Collaborative Group Work , Lab , Lecture: Discussion and Collaborative group work.

Methods of Evaluation:

Exams/Tests/Quizzes
Problem Solving
Skill Demonstrations

Assignments

Typical Assignments:

Reading:

Text Technical service bulletins related to cooling and heating issues

Writing, Problem Solving or Performance:

Lab: Diagnose the heating and air conditioning system for proper operation.

Lecture: Write a short essay that compares and contrasts domestic heating/cooling systems with import systems.

Other:

Required Materials Examples:

Book 1

Author: Duffy, James E	Publication Date: 2014	Edition: 8th
Title:Modern Automotive Technology	Publisher: Goodheart-Wilcox Company, Inc.	

Manual 1

Author: Johanson, Chris	Publication Date: 2005-01-01 00:00:00.0
Title:Modern Automotive Technology Shop Manual	Publisher: Goodheart-Wilcox Company, Inc.

Course Preparation:

Prerequisite(s):	None
Co-Requisite(s):	None
Recommended:	AUTO 101

Document Content Review

Target Course Skills

Condition on Enrollment

Renewed

Faculty

Gary Sornborger

Basic Content Review

Students who have completed AUTO-101 have met the following SLO's: 1) Analyze the theory and operation of an internal combustion engine. 2) Perform basic engine diagnostics, complete engine dis-assembly, component inspection and reassembly of engine replacing worn parts. These are foundational skills recommended for success in AUTO-094.

COLLEGE OF THE CANYONS

AUTO 101 - Automotive Engine Fundamentals

Approval Date: 02/07/2008 Effective Term: Fall 2008

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 4.00
Grading Option: Letter Grade
Transferability: CSU Transferable
Course is: AA/AS Degree
Repeatability:
Contact Hours per Term:
Lecture/Discussion: *54.00*
Lab: *66.00*
Associate Degree GE Applicability: No
Recommended Class Size: 35

Discipline/Minimum Qualifications:

Auto Mechanics

Catalog Description:

Theory and practice in automotive engine repair, including operating principles and descriptions of all components in an engine. Emphasizes diagnosis and measurement of internal engine components, as well as complete dis-assembly and assembly of engines.

Schedule Description:

Theory and practice in automotive engine repair, including operating principles and descriptions of all components in an engine

Student Learning Outcome:

1. Perform basic engine diagnostics, complete engine dis-assembly, component inspection and reassembly of engine replacing worn parts.

Course Objectives:

1. Describe safety precautions taken when using various tools and equipment.
2. Delineate what different measurements mean in both United States customary and metric measurement systems.
3. Research applicable service information and specifications using factory manuals and shop computer program.
4. Describe the functions the different kinds of equipment can test and the problems they can diagnose.
5. Operate hand held diagnostic tools to perform cylinder balance and compression testing.
6. Recognize parts pertaining to the crankshaft.
7. Compare and contrast the types of cylinder heads and their differences.
8. Describe engine components and their functional differences between aluminum heads and engine blocks versus like cast iron components.
9. Identify and describe different cylinder and valve arrangements.
10. Correctly install engine main bearings and crankshaft rear seals, install crankshaft, and determine bearing clearance.
11. Describe how to and apply proper timing techniques using manufacturer's special tools and equipment to overhead camshaft engine components.
12. Describe the usage of torque, demonstrate proper techniques in de-torquing and torquing to yield fasteners.
13. Perform thread repair to factory specs using manufacturer's tools and equipment.

14. Perform machine shop and service operations pertaining to aluminum cylinder head and blocks components using special factory tools and equipment.
15. Perform engine dis-assembly using special tools and equipment.
16. Perform engine assembly using special tools and equipment both generic and manufacturer's .

Course Content Outline:

A. Shop safety
B. Tools of the trade
C. Measuring
D. Shop manual
E. Test equipment
F. Engines design
G. Crankshaft components
H. Cylinder heads
I. Valve train
J. Engine disassembly

Methods of Instruction:

Lab , Lecture:

Methods of Evaluation:

Exams/Tests/Quizzes
Problem Solving
Skill Demonstrations

Written Assignments

Typical Assignments:

Reading:
Text Manufacturer's manuals

Writing, Problem Solving or Performance:
Short essays Lab notebook

Other:
Apply lecture/text information to lab activities

Required Materials Examples:

Book 1

Author: Hughes, James | Publication Date: 2003 | Edition: 2nd
Title:Automotive Engine Rebuilding | Publisher: Prentice Hall

Course Preparation:

Prerequisite(s):	None
Co-Requisite(s):	None
Recommended:	None

COLLEGE OF THE CANYONS

AUTO 101 - Automotive Engine Fundamentals

Approval Date: 02/07/2008 Effective Term: Fall 2008

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 4.00
Grading Option: Letter Grade
Transferability: CSU Transferable
Course is: CSU Transferable
Repeatability: Not Repeatable
Contact Hours per Term:
Lecture/Discussion: *54.00*
Lab: *66.00*
Associate Degree GE Applicability: No
Recommended Class Size: 35

Discipline/Minimum Qualifications:

Auto Mechanics Auto Mechanics

Catalog Description:

Theory and practice in automotive engine repair, including operating principles and descriptions of all components in an engine. Emphasizes diagnosis and measurement of internal engine components, as well as complete dis-assembly and assembly of engines.

Schedule Description:

Theory and practice in automotive engine repair, including operating principles and descriptions of all components in an engine.

Student Learning Outcome:

Lecture SLO

1. Analyze the theory and operation of an internal combustion engine.

Lab SLO

1. Perform basic engine diagnostics, complete engine dis-assembly, component inspection and reassembly of engine replacing worn parts.

Course Objectives:

Lecture

1. Describe safety precautions taken when using various tools and equipment.
2. Delineate what different measurements mean in both United States customary and metric measurement systems.
3. Research applicable service information and specifications using factory manuals and/or vehicle manufacturers' diagnostic and repair information programs, such as ALLDATA and Mitchell On Demand.
4. Describe the functions of the different types of available test equipment and its ability to test systems and components.
5. Recognize parts pertaining to the crankshaft and camshaft.
6. Compare and contrast the types of cylinder heads and their differences.
7. Describe engine components and their functional differences between aluminum heads and engine blocks versus like cast iron components.
8. Identify and describe different cylinder and valve arrangements, including overhead value arrangements.

9. Describe how to and apply proper timing techniques using manufacturer's special tools and equipment necessary to time overhead camshaft engine components.
10. Describe the usage for each of the common tools of the trade.

Lab

1. Perform diagnostic testing using special tools.
2. Perform engine dis-assembly using special tools and equipment.
3. Correctly install engine main bearings and crankshaft rear seals, install crankshaft, and determine bearing clearance.
4. Perform thread repair to factory specs using manufacturer's tools and equipment.
5. Perform machine shop and service operations pertaining to aluminum and/or cast iron cylinder heads and blocks using special factory tools and equipment.
6. Perform engine assembly using special tools and equipment both generic and manufacturer's.
7. Prepare engine to start.

Course Content Outline:

LECTURE

A. Shop safety

1. Autoshop layout
    A. Shop stall
    B. Lift
    C. Alignment rack
    D. Outside work area
    E. Toolroom
    F. Classroom
2. General shop safety
    A. Clean floors
    B. Tool cleaning
3. Types of accidents
    A. Fires
    B. Explosions
    C. Asphyxiation
    D. Chemical burns
    E. Electric shock
    F. Hybrid safety
    G. Physical injury

B. Tools of the trade

1. Tool rules & storage
2. General wrenches & torque wrenches
3. Screwdrivers
4. Pliers
5. Hammers
6. Chisels & punches
7. Files
8. Clamps and other holding tools
9. Sockets & Ratchets
10. Blowguns & pneumatic tools
11. Grinder & drills
12. Engine hoist
13. Hydraulic press
14. Torque angle gauge

C. Measurement Tools & Systems

1. Measurement tools
    A. Calipers
    B. Micrometers
    C. Feeler Gauges
    D. Dial indicator

    E. Plastigauges
2. Measurement Systems
    A. US Customary units of measure
    B. Metric system
3. Types of Measurements
    A. Angle measurements
    B. Temperature Measurement
    C. Torque wrenches
    D. Pressure gauge
    E. vacuum gauge
    F. Compression gauge
    G. Leak-down gauge

D. Factory manuals and/or vehicle manufacturers' diagnostic and repair information programs

1. Factory manuals
2. Mitchell On Demand program
3. ALLDATA program

E. Test equipment

1. Leakdown/compression test
2. Vacuum gauge
3. Scanner
4. Digital Volt Ohm Meter
5. Battery charger

F. Engine construction

1. Four-stroke motor
    A. Pushrod motors
    B. Overhead cam motors
2. Engine Block
    A. Aluminum engine block
    B. Cast iron engine block

G. Crankshaft/camshaft components

1. Rods
2. Pistons
3. Wristpins
4. Rings & Bearings
5. Value Lifters
6. Pushrods
7. Rocker arm construction
8. Timing gears
9. Timing chain & sprockets
10. Auxilary chain & balancer shaft
11. Timing belt & sprockets

H. Cylinder heads

1. Valve guide construction
2. Valve seat construction
3. Combustion chamber design
4. Variable valve timing systems
5. Valve springs
6. Valve spring shims

I. Valve train

1. Valve seal construction
2. Valve spring construction
3. Valve spring shim
4. Valve retainers & keeprs
5. Valve spring seat
6. Valve rotators
7. Valve stem cap

LAB

A. Diagnostic Testing

1. Leakdown test
2. Compression test
3. Vacuum test
4. Power balance test

B. Cylinder Heads Problems

1. Burned valve
2. weak valve spring
3. bad valve seal
4. warped head
5. worn camshaft

C. Cylinder Block Problems

1. Burned piston
2. Worn, cracked or broken compression rings
3. Worn, cracked or broken oil control rings
4. Worn, cracked or broken wristpin
5. Worn, cracked or broken connecting rod or bearings
6. Damaged or worn crankshaft/bearings

D. Dis-assemble Engine

1. Remove valve covers, carburator & intact manifold
2. Remove rocker arms and pushrods
3. Remove cylinder heads
4. Extract lifters
5. Remove water pump, timing chain cover, chain, gears,
6. Remove camshaft an d cylinder heads
7. Invert motor on engine stand
8. Remove oil pan, and rod caps
9. Rotate motor and extract pistons and piston rods
10. Invert motor to remove crankshaft
11. Inspect parts

E. Engine block assembly

1. Install crankshaft, new bearings, & plastigauge
2. Install rings on pistons
3. Hang piston on the rod
4. Install the rods, pistons & bearings onto crankshaft
5. Plastigauge & torque to specfications

F. Cylinder head assembly

1. Measure valve spring height & valve contact
2. Assemble valves into head
3. Install valve seals, springs on valves with keepers

G. Install Cylinder Head to Engine Block

1. Proper head gasket
2. Install head bolts
3. Torque to specification

H. Timing the motor

1. Install crankshaft gear
2. Install camshaft gear
3. Find top-dead center
4. Line marks on timing gears
5. Install timing gears, chain, or belt

Methods of Instruction:

Lecture , Lab: Videos/DVD's , In-class writing , Collaborative group work and Student Presentations.

Methods of Evaluation:

Exams/Tests/Quizzes
Oral Presentations
Problem Solving
Research Projects
Skill Demonstrations

__Prepare a "Dream Machine" Project - each student prepares a researched based project on a "dream machine's" engine and related information.

Typical Assignments:

Reading:

Read selected pagess from Modern Automotive Technology textbook.

Read from selected websites for research project.

Writing, Problem Solving or Performance:

Answer assigned questions and demonstrate performance for each task in the NATEF Standards Job Sheets for Peformance-Based Learning

Other:

Research project

Required Materials Examples:

Book 1

Author: Duffy, James E	Publication Date: 2009	Edition: 7th
Title:Modern Automotive Technology	Publisher: Goodheart-Wilcox Company, Inc	

Manual 1

Author: Johanson, Chris
Publication Date: 2005-01-01 00:00:00.0
Title:Modern Automotive Technology Shop Manual
Publisher: Goodheart-Wilcox Company, Inc

Periodical 2

Author:
Publication Date: 2013
Volume:
Title:Hotrod
Publisher:

Periodical 3

Author:
Publication Date: 2013
Volume:
Title:Car & Driver
Publisher:

Periodical 4

Author:
Publication Date: 2013
Volume:
Title:Society of Automotive Engineers Journal (SAE)
Publisher:

Periodical 5

Author:
Publication Date: 2013
Volume:
Title:Road & Track
Publisher:

Other:

online databases for car manuals: ALLDATA and Mitchel OnDemand

Course Preparation:

Prerequisite(s): None
Co-Requisite(s): None
Recommended: None

COLLEGE OF THE CANYONS

AUTO 102 - Engine Performance I

Approval Date: 02/07/2008 Effective Term: Fall 2008

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 4.00
Grading Option: Letter Grade
Transferability: CSU Transferable
Course is: AA/AS Degree
Repeatability:
Contact Hours per Term:
Lecture/Discussion: *45.00*
Lab: *81.00*
Associate Degree GE Applicability: No
Recommended Class Size: 35

Discipline/Minimum Qualifications:

Catalog Description:

Provides a foundation of the design and operation of domestic and import ignition, fuel, and emission control systems. Emphasis is placed on the problems of accurate diagnosis and the proper repair procedures for these engine systems.

Schedule Description:

Provides a foundation of the design and operation of domestic and import ignition, fuel, and emission control systems

Student Learning Outcome:

1. Assess drivability and perform automotive engine diagnosis and repair of specific systems including ignition, fuel and emissions systems.

Course Objectives:

1. Diagnose ignition problems with an oscilloscope
2. Apply the latest safety standards when working on ignition and fuel systems
3. Display proficient use of various electronic test equipment including meters, analyzers and diagnostic testers and scanners
4. Describe the operation of various engines, ignition, fuel and engine computer control feedback systems
5. Diagnose and repair engine, ignition, fuel and engine computer control feedback systems failures
6. Service various engine, ignition, fuel and computer control systems to industry and manufacture standards

Course Content Outline:

1. Shop
a. Facilities
b. Routine
c. Tool room Procedures

2. Safety and Haz Mat training
a. Review of fundamentals
b. Application to shop
c. Safety test

3. Automotive Engine
a. Basic Design

b. Four-stroke Cycle
c. Measurement of Engine Output
d. Mechanical Testing
1. compression
2. leakage
3. Vacuum
e. Valve adjustment

4. Conventional Ignition System
a. Basic Design
b. Principles of Operation
c. System Service
1. Replacing and Adjusting Points
2. Spark Plug Replacement
3. Spark Plug Cable Testing and Replacement
4. Distributor Removal and Replacement
5. Checking and Adjusting Base Timing
6. Testing Distributor Advance Curve

5. Oscilloscope
a. Pattern Interpretation
b. Hook-up and Manual Tests
c. Computerized Tests

6. General Motors Electronic Ignition Systems
a. HEI
1. Basic Design
2. Theory of Operation
3. Testing for No-start
4. Oscilloscope Pattern

7. Ford Electronic Ignition Systems
a. Duraspark with Conventional Vacuum and Centrifugal Advance Mechanisms
1. Basic Design
2. Theory of Operation
3. Testing for No-spark
4. Oscilloscope Pattern

8. Chrysler Electronic Ignition Systems
a. conventional EIS
1. Basic Design
2. Theory of Operation
3. Testing for No-start
4. Oscilloscope Pattern

9. Import Systems
a. Typical Import System
1. Basic Design
2. Theory of Operation
3. Testing for No-start
4. Oscilloscope Pattern

10. Emission Controls
a. Impact of Legislation
1. Federal
2. State
3. BAR Certification
b. Crankcase Emission Controls
a. Basic Design
b. Theory of Operation
c. Testing and Service
c. Air Injection
a. Basic Design
b. Theory of Operation
c. Testing and Service

d. Com puter control
d. Exhaust Gas Recirculation
a. Basic Design
b. Theory of Operation
c. Testing and Service
d. Computer control
e. Evaporation
a. Basic Design
b. Theory of Operation
c. Testing and Service
d. Computer control
f. Catalytic Converter
a. Basic Design
b. Theory of Operation
c. Testing
d. Air Management
g. Engine Modification
a. Basic Design Changes
b. Testing

11. Low Emission Tune-Up
a. Function
b. Procedure
1. Inspection
2. System Analysis
3. Parts Replacement
4. Low-emission Testing

Methods of Instruction:

Lab , Lecture:

Methods of Evaluation:

Exams/Tests/Quizzes
Problem Solving
Skill Demonstrations

Typical Assignments:

Reading:

text reading Individual Manufacturer's Manuals Industry journals, i.e. "Motor Age" or "Import Service"

Writing, Problem Solving or Performance:

problem solving exercises

Other:

Required Materials Examples:

Book 1

Author: James D. Halderman and Chase D. Mitchell	Publication Date: 2006	Edition: 2nd
Title:Automotive Engine Performance	Publisher: Prentice Hall	

Book 2

Author: Ken Pickerill	Publication Date: 2004	Edition: 4th

Title:Today's Technician, Automotive Engine Performance Classroom and Shop Maual	Publisher: CENGAGE Delmar Learning

Other:

safety glasses, shop clothing

Course Preparation:

Prerequisite(s):	AUTO 101
Co-Requisite(s):	None
Recommended:	None

Document Content Review

Target Course Skills

Condition on Enrollment

Established

Faculty

Gary Sornborger Tony Asebedo (Mt. San Jacinto and NATEF Consultant) Audrey Green (Administrator)

Basic Content Review

1. Describe safety precautions taken when using various tools and equipment. 2. Delineate what different measurements mean in both United States customary and metric measurement systems. 3. Research applicable service information and specifications using factory manuals and shop computer program. 4. Describe the functions the different kinds of equipment can test and the problems they can diagnose. 5. Operate hand held diagnostic tools to perform cylinder balance and compression testing. 6. Compare and contrast the types of cylinder heads and their differences. 7. Describe engine components and their functional differences between aluminum heads and engine blocks versus like cast iron components. 8. Identify and describe different cylinder and valve arrangements. 9. Describe how to and apply proper timing techniques using manufacturer's special tools and equipment to overhead camshaft engine components. 10. Describe the usage of torque, demonstrate proper techniques in de-torquing and torquing to yield fasteners. 11. Perform engine disassembly using special tools and equipment. 12. Perform engine assembly using special tools and equipment both generic and manufacturer's .

COLLEGE OF THE CANYONS

AUTO 102 - Engine Performance I

Approval Date: 02/07/2008 Effective Term: Fall 2008

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 4.00
Grading Option: Letter Grade
Transferability: CSU Transferable
Course is: CSU Transferable
Repeatability: Not Repeatable
Contact Hours per Term:
Lecture/Discussion: *45.00*
Lab: *81.00*
Associate Degree GE Applicability: No
Recommended Class Size: 28
-Rationale: Safety requirements mandate smaller than 35 class size

Discipline/Minimum Qualifications:

Catalog Description:

Provides a foundation of the design and operation of domestic and import ignition, fuel, and emission control systems. Emphasis is placed on the problems of accurate diagnosis and the proper repair procedures for these engine systems.

Schedule Description:

Provides a foundation of the design and operation of domestic and import ignition, fuel, and emission control systems.

Student Learning Outcome:

Lecture

1. Assess drivability and discuss automotive engine diagnosis and repair of specific systems including ignition, fuel and emissions systems, computer control and CAN (Controlled Area Network).

Lab

1. Perform automotive engine diagnosis and repair of specific systems including ignition, fuel, emissions and computer control.

Course Objectives:

Lecture

1. Explain the latest safety standards when working on ignition and fuel systems
2. Describe the operation of various engines, ignition, fuel and engine computer control feedback systems
3. Compare and contrast between different manufacturer specific electronic ignition systems.
4. Analyze tailpipe emissions and relate to engine proficiency and performance according to State and Federal Regulations.
5. Explain how ignition systems would relate to hydrocarbons, fuel systems relate to carbon monoxide, and combustion temperatures relate to knocks.
6. Analyze the record stored OBD II diagnostic trouble codes.

Lab

1. Diagnose and repair engine, ignition, fuel and engine computer control feedback systems failures
2. Service various engine, ignition, fuel and computer control systems to industry and manufacturer standards
3. Demonstrate proficient use of various electronic test equipment including meters, analyzers and diagnostic testers and scanners
4. Diagnose ignition problems with an oscilloscope
5. Perform emission test in loaded mode to analyze nitrogen oxides (NOx) produced during combustion.
6. Retrieve and record stored OBD II diagnostic trouble codes.

Course Content Outline:

LECTURE

1. Shop Safety

   a. Facilities & Layout
   b. Routine
   c. Tool Room Procedures
   d. Safety and Haz Mat training
   e. Safety test

2. Automotive Engine

   a. Basic Design
   b. Four-stroke Cycle
   c. Measurement of Engine Output
   d. Mechanical Testing
      1. compression
      2. leakage
      3. Vacuum
   e. Valve adjustment

3. Conventional Ignition System

   a. Basic Design
   b. Principles of Operation
   c. System Service
   d. Pattern interpretation from Oscilloscope

4. Electronic computer control systems
   a. On-board diagnostic first & second generation systems
   b. Controlled area network (CAN) system

5. General Motors Electronic Ignition Systems
   a. HEI
      1. Basic Design
      2. Theory of Operation
      3. Testing for No-start
      4. Oscilloscope Pattern

6. Ford Electronic Ignition Systems
   a. Duraspark with Conventional Vacuum and Centrifugal Advance Mechanisms
      1. Basic Design
      2. Theory of Operation
      3. Testing for No-spark
      4. Oscilloscope Pattern

7. Chrysler Electronic Ignition Systems
   a. Conventional EIS
      1. Basic Design
      2. Theory of Operation

3. Testing for No-start
4. Oscilloscope Pattern

8. Import Systems
   a. Basic Design
   b. Theory of Operation
   c. Testing for No-start
   d. Oscilloscope Pattern

9. Gas Analysis & Engine Performance
   a. Oxygen
   b. Hydrocarbons
   c. Carbon monoxide
   d. Nitrogen oxides
   e. Carbon dioxide

10. Emission System Regulation - Impact of Legislation
   1. Federal
   2. State of California Bureau of Automotive Repair Certification

11. Emission Control Systems & Components (Basic Theory & Design)
   a. Crankcase Emission controls
   b. Air Injection
   c. Exhaust Gas Recirculation
   d. Fuel Evaporation systems
   e. Catalytic Converter
   f. Air Managment

12. Fuel Systems
   a. Throttle body fuel injection
   b. Multiport fuel injection
   c. Carburetor

LAB

1. Engine Performance

   a. Inspection
   b. Replacing and Adjusting Points
   c. Spark Plug Replacement
   d. Spark Plug Cable Testing and Replacement
   e. Distributor Removal and Replacement
   f. Checking and Adjusting Base Timing
   g. Testing Distributor Advance Curve
   h. Check and adjust Air Gap in HEI Ignition systems
   i. Fuel injection systems or carburetor

2. Oscilloscope
   a. Hook-up and Manual Tests
   b. Computerized Tests
   c. Analysis

3. Testing & Service Emission Controls
   a Crankcase Emission Controls
   b. Air Injection
   c. Exhaust Gas Recirculation
   d. Fuel evaporation System
   e. Catalytic Converter
   f. Air Management
   g. Nitrogen oxides Analysis

4. Service Computer control systems
   a. Technical Service Bulletins - - using ALL DATA or Mitchell-On-Demand
   b. Service Recalls - using ALL DATA or Mitchell-On-Demand
   c. Driveability issues
   d. Reflashing Computer with current updates

5. Use of electronic test equipment
   a. Scanners
   b. Digital Storage Oscilloscope (DSO) - to check parts
   c. 5-gas Analyzer

Methods of Instruction:

Lab , Lecture: In-class writing , Collaborative group work and Student Presentations.

Methods of Evaluation:

Exams/Tests/Quizzes
Oral Presentations
Problem Solving
Research Projects
Skill Demonstrations

____Prepare a "Dream Machine" project - each student prepares a researched based project on a "dream machine's" engine and related information.

Typical Assignments:

Reading:

Text reading
Individual Manufacturer's Manuals
Industry journals, i.e. Motor Age, Import Service, Hotrod Magazine, Road & Track

Writing, Problem Solving or Performance:

Problem solving exercises

Dream Machine project - research/presentation project

Library research project

Other:

Required Materials Examples:

Book 1

Author: James E Duffy | Publication Date: 2009 | Edition: 7th

Title:Modern Automotice Technology | Publisher: Goodheart-Wilcox Company, Inc

Book 2

Author: Chris Johanson | Publication Date: 2005 | Edition: 2

Title:Modern Automotice Technology Shop Manual | Publisher: Goodheart-Wilcox Company, Inc

Periodical 1

Author: | Publication Date: 2013 | Volume:

Title:Society of Automotive Engineers (SAE) | Publisher:

Periodical 2

Author: | Publication Date: 2013 | Volume:

Title:Car & Driver | Publisher:

Other:

safety glasses, shop clothing online databases for car manuals: ALLDATA and Mitchel OnDemand

Course Preparation:

Prerequisite(s):	None
Co-Requisite(s):	None
Recommended:	AUTO 101

COLLEGE OF THE CANYONS

AUTO 103 - Automotive Electrical Systems

Approval Date: 12/01/2011 Effective Term: Fall 2012

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 5.00
Grading Option: Letter Grade
Transferability: CSU Transferable
Course is: AA/AS Degree
Repeatability:
Contact Hours per Term:
Lecture/Discussion: *4.00*
Lab: *3.00*
Associate Degree GE Applicability: No
Recommended Class Size: 35

Discipline/Minimum Qualifications:

Auto Mechanics

Catalog Description:

Presents the theory and practical application of basic electricity and automotive electrical systems such as battery, starting, charging, and electronic ignition. Laboratory work includes repair work on starters, alternators and trouble shooting components of the electrical system as well as practice with the latest diagnostic equipment.

Schedule Description:

Presents the theory and practical application of basic electricity and automotive electrical systems such as battery, starting, charging, and electronic ignition.

Student Learning Outcome:

1. Apply electrical theory and use appropriate equipment to diagnose automotive electrical problems as well as recommend/provide required service.

Course Objectives:

1. Read and interpret wring diagrams to repair automobiles.
2. Use digital and analog volt meters, ammeters and ohmmeters to automobiles.
3. Test and service automobile batteries.
4. Test and repair automotive starters and circuits.
5. Test and repair automotive charging devices and circuits.
6. Test, service and repair automotive lighting systems.

Course Content Outline:

1. Safety/shop practice
2. Introduction to electricity
a. Meter usage
b. Wiring repair procedures
3. Battery construction, storage and testing
4. Starter motor principles and starting circuits
5. Starter motor overhaul and trouble shooting procedures
6. Generator charging system
a. Alternator principles and charging circuits
7. Ignition systems
8. Advanced semiconductors
9. Electronic ignition
10. Computer systems
11. Lighting circuits and headlamp aiming

12. Horns and indicating devices
13. Fuses, fuse links, circuit breakers and relays
14. Power window and door lock circuits and testing
15. Accessory circuits and testing
16. Alternate power sources

Methods of Instruction:

Lab , Lecture:

Methods of Evaluation:

Exams/Tests/Quizzes
Problem Solving
Skill Demonstrations

Typical Assignments:

Reading:
Text Handouts

Writing, Problem Solving or Performance:
Problem solving exercies-practical and written Demonstration

Other:

Required Materials Examples:

Book 1

Author: Halderman, James	Publication Date: 2006	Edition: 4th
Title:Diagnosis and Trouble Shooting of Automotive Electrical, Electronic and Computer Systems	Publisher: Prentice Hall	

Other:

Shop safety glasses, shop clothing

Course Preparation:

Prerequisite(s):	None
Co-Requisite(s):	None
Recommended:	AUTO 101

COLLEGE OF THE CANYONS

AUTO 104 - Steering, Suspension and Alignment

Approval Date: 02/07/2008 Effective Term: Fall 2008

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 3.00
Grading Option: Letter Grade
Transferability: CSU Transferable
Course is: AA/AS Degree
Repeatability: Not Repeatable
Contact Hours per Term:
Lecture/Discussion: *2.00*
Lab: *4.00*
Associate Degree GE Applicability: No
Recommended Class Size: 35

Discipline/Minimum Qualifications:

Auto Mechanics

Catalog Description:

Provides theory, diagnosis and repair procedures of modern suspension and steering systems on import and domestic vehicles.

Schedule Description:

Provides theory, diagnosis and repair procedures of modern suspension and steering systems on import and domestic vehicles.

Student Learning Outcome:

1. Diagnose and repair suspension and alignment problems in automobiles.

Course Objectives:

1. Compare and contrast various types of chassis construction and list their manufacturer.
2. Inspect, diagnose, repair, and align steering and suspension systems using modern alignment equipment.
3. Demonstrate the repair of steering columns.
4. Compare and contrast various types of alignment equipment.

Course Content Outline:

1. Safety
a. Review of Safety fundamentals
b. Safety test
c. Hazardous materials review

2. Tools
a. Nomenclature
b. Use and care of tools and equipment
c. Special tools

3. Chassis construction
a. identification

4. Suspension and Steering
a. Wheel & tire assembly
1. bearing packing
2. tire wear diagnosing
3. run-out checks

4. tire rotation
5. wheel balancing

b. Suspension
1. ball joints
2. king pins
3. springs
4. stabilizer and strut rod
5. complete suspension rebuild

c. Steering
1. steering linkage
2. steering gears (manual)

d. Alignment
1. steering geometry
2. pre-alignment inspection
3. passenger car alignment
4. straight axle alignment
5. rear axle alignment

e. Steering columns
1. collapsible columns
2. moveable columns
3. ignition switch locks
4. other electrical switches

Methods of Instruction:

Lab , Lecture:

Methods of Evaluation:

Exams/Tests/Quizzes
Problem Solving
Skill Demonstrations

Typical Assignments:

Reading:
Text online reading assignments

Writing, Problem Solving or Performance:
written lab exercies problem solving lab exercies

Other:

Required Materials Examples:

Book 1

Author: Halderman, James D., Rehkopf, Jeffrey

Publication Date: 2006

Edition: 3rd

Title:Automotive Steering, Suspension and Wheel Alignment

Publisher: Prentice Hall

Other:

safety glasses, shop clothes

Course Preparation:

Prerequisite(s):	None
Co-Requisite(s):	None
Recommended:	None

COLLEGE OF THE CANYONS

AUTO 105 - Automatic Transmissions

Approval Date: 12/01/2011 Effective Term: Fall 2012

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 5.00
Grading Option: Letter Grade
Transferability: CSU Transferable
Course is: AA/AS Degree
Repeatability:
Contact Hours per Term:
Lecture/Discussion: *4.00*
Lab: *3.00*
Associate Degree GE Applicability: No
Recommended Class Size: 35

Discipline/Minimum Qualifications:

Auto Mechanics

Catalog Description:

Introduces the theory and principles of automatic transmissions and transaxles. Procedures for diagnosing problems, adjusting, and overhauling the automatic transmission and transaxle are studied and applied in the shop.

Schedule Description:

Introduces the theory and principles of automatic transmissions and transaxles. Procedures for diagnosing problems, adjusting, and overhauling the automatic transmission and transaxle are studied and applied in the shop.

Student Learning Outcome:

1. Complete dis-assembly and successfully assemble an automatic transmission.

Course Objectives:

1. Identify automatic transmissions by using identification tags, serial numbers, bell housing and pan gaskets.
2. Describe how and why automatic transmissions require period service.
3. Describe how transmission/transaxle hydraulic use force, pressure, and mechanical advantage.
4. Delineate how mainline, throttle, and governor pressure are used in automatic transmissions.
5. Analyze the importance of keeping components in sub-assemblies when disassembling a transmission or transaxle.
6. Identify the parts of planetary gear sets.
7. Compare and contrast the construction and operation of torque and fluid couplings.
8. Identify and describe the uses of bearings, bushings and thrust washers in automatic transmissions.
9. Evaluate the importance of cleanliness when working on automatic transmissions or transaxles.
10. Delineate the importance of the transmission's cooling system.
11. Compare and contrast the major electronic inputs to an electronic transmission control module.
12. Evaluate common safety practices used when removing and replacing an automatic transmission in a vehicle.
13. Analyze the benefit of using an automatic transmission with a hybrid vehicle platform.

Course Content Outline:

I. Safety
a. Shop safety
b. EPA and OSHA regulations

II. Automatic Transmissions Theory of Operation
a. Hydraulic principles
b. Hydraulic system components
c. Fluids
d. Replacing seals and bushings

III. Diagnosing transmission/transaxle malfunction
a. Disassembly procedures
b. Inspection of parts
c. Planetary gear sets
d. Fluid coupling and torque converters
e. Bearing, bushings, and thrust washers
f. Reassembly
g. Bench testing and inspection

IV. Transmission coolers

V. Hybrid vehicle transmissions

Methods of Instruction:

Lab , Lecture:

Methods of Evaluation:

Exams/Tests/Quizzes
Problem Solving
Skill Demonstrations

Writing Assignments

Typical Assignments:

Reading:
Text Industry journal artiles

Writing, Problem Solving or Performance:
Written study questions Shop notebook

Other:
Create assembly and dis-assembly flowcharts

Required Materials Examples:

Book 1

Author: Erjavec, Jack	Publication Date: 2002	Edition: 3rd
Title:Today's Technician, Automotive Transmission and Transaxles	Publisher: Thompson Delmar Publications	

Course Preparation:

Prerequisite(s):	None
Co-Requisite(s):	None
Recommended:	AUTO 101

COLLEGE OF THE CANYONS

AUTO 106 - Manual Transmissions, Transaxles and Drivetrains

Approval Date: 12/01/2011 Effective Term: Fall 2012

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 5.00
Grading Option: Letter Grade
Transferability: CSU Transferable
Course is: AA/AS Degree
Repeatability:
Contact Hours per Term:
Lecture/Discussion: *4.00*
Lab: *3.00*
Associate Degree GE Applicability: No
Recommended Class Size: 35

Discipline/Minimum Qualifications:

Auto Mechanics

Catalog Description:

Presents the principles, theory, operation, and diagnosis of problems and service procedures of clutches, manual transmissions, drive-lines, transfer cases, and transaxle assemblies, including non-slip differentials.

Schedule Description:

Presents the principles, theory, operation, and diagnosis of problems and service procedures of clutches, manual transmissions, drive-lines, transfer cases, and transaxle assemblies, including non-slip differentials.

Student Learning Outcome:

1. Successfully disassemble and successfully reassemble a manually operated transmission or transaxle and inspect and service a rear axle assembly.

Course Objectives:

1. Measure and adjust the clutch pedal free travel for the following types: a. Mechanical linkage b. Cable type c. Hydraulic
2. Identify all the components of a manual transmission
3. Remove and replace a manual transmission
4. Overhaul a manual transmission with overdrive
5. Measure and adjust manual transmission shift linkage
6. Inspect the front-wheel drive-line for worn part
7. Remove and replace a removable differential
8. Overhaul and integral differential
9. Remove and replace axle, axle bearing, and seal
10. Service all wheel drive viscous coupling
11. Overhaul four wheel drive transfer case
12. Compare and Contrast the operation of a hybrid vehicle power train

Course Content Outline:

I. Clutches
a. Types
b. Theory of operation
c. Service procedures
d. Throw out bearings

e. Adjustments

II. Transmissions
a. Types
i. 3-speed
ii. 4-speed
iii. 5-speed
b. Theory of operation
c. Service procedures

III. Transfer cases and four-wheel drive

IV. Propeller shaft

V. Drive Lines
a. Types
b. Universal joints
c. Service procedures
d. Balancing

VI. Differential and drive axles
a. Types
b. Theory of operation
c. Service procedures
d. Diagnosis

VII. Final drive service

VIII. All wheel drive systems

IX. All wheel drive service

X. Hybrid vehicle power train systems

Methods of Instruction:

Lab , Lecture:

Methods of Evaluation:

Exams/Tests/Quizzes
Problem Solving
Skill Demonstrations

Writing Assignments

Typical Assignments:

Reading:

Text Industry journal articles

Writing, Problem Solving or Performance:

Written assignments that describe operations completed in lab experiences Written study question assignments Perform lab assignments that require problem solving

Other:

Required Materials Examples:

Book 1

Author: Erjavec, Jack Publication Date: 2005 Edition: 4th

Title:Today's Technician, Manual Transmission and Transaxles	Publisher: Thompson Delmar

Course Preparation:

Prerequisite(s):	None
Co-Requisite(s):	None
Recommended:	AUTO 101

COLLEGE OF THE CANYONS

AUTO 107 - Advanced Electrical Systems

Approval Date: 12/01/2011 Effective Term: Fall 2012

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 4.00
Grading Option: Letter Grade
Transferability: CSU Transferable
Course is: AA/AS Degree
Repeatability: Not Repeatable
Contact Hours per Term:
Lecture/Discussion: *54.00*
Lab: *54.00*
Associate Degree GE Applicability: No
Recommended Class Size: 35

Discipline/Minimum Qualifications:

Auto Mechanics

Catalog Description:

Presents the advanced theory and practice of the automotive body electrical system, including all classes of electrical components and power accessories.

Schedule Description:

Presents the advanced theory and practice of the automotive body electrical system, including all classes of electrical components and power accessories.

Student Learning Outcome:

Lecture:

1. Analyze advanced automotive electrical problems per NATEF standards.

Lab:

1. Use appropriate equipment to diagnose and repair advanced automotive electrical problems per NATEF standards.

Course Objectives:

Lecture:

1. Identify the advanced electrical complaint and formulate the appropriate diagnosis.
2. Interpret electrical diagrams and schematics.
3. Collect relevant vehicle information using the Vehicle identification number (VIN).
4. Compare and contrast the differences in series electrical/electronic circuits from parallel
5. Compare and contrast the various indicating devices used on cars and explain how they harness and be able to make repairs.
6. Assess an open or short circuit in the instrument panel wiring harness and make necessary repairs.

Lab:

1. Apply the appropriate diagnosis to resolve the customer complaint.
2. Repair shorts, grounds, opens, and resistance problems using electrical diagrams and schematics.
3. Measure source voltage and the voltage drop over series and parallel circuits.
4. Analyze exhaust gas emissions for the engine specifications identified by the VIN.

5. Test fusible links, circuit breakers, fuses, switches, connectors, relays, solenoids, solid state devices demonstrating the proper use of the appropriate diagnostic equipment and diagnostic repair programs such as ALL DATA and Mitchell ON DEMAND.

Course Content Outline:

Lecture:

1. Shop Safety

2. Advanced Electrical Systems
DVOM
DSO
Test Light
AMP Probe

3. Introduction to automotive microprocessors and computers
Scanners: Modos, Vantage, Pro, Ethos

4. Diagnostic equipment and special tools
Sodering and safety procedures

5. Electrical wiring diagrams

6. Electrical system trouble shooting
Voltage flow chart specifications per manufacturer's requirements

7. Lighting systems and circuits
wiring schematics
voltage drops
dial electric grease

8. Instruments and gauges
sensor gage failure
voltage drops and breaks in harness
color codes

9. Power Accessories
safety issues
switches and color codes
voltage drops

10.Windshield wiper systems
speeds
voltage to speeds
required voltage
park circuit
voltage drops and color codes

11.Optional electrical devices
Audio systems
Navigation systems

Lab:

1. Sodering circuits and voltage drops
2. Scanners modifications vantage
3. color code to switches and motors
4. flow charts and pin point tests
5. required voltage and voltage drops
6. use of dial electric grease on pins, plugs and connectors
7. test light and DVOM for sensors and gages
8. effective use of diagnostic programs such as ALL DATA and Mitchell on Demand.

Methods of Instruction:

Lab , Lecture:

Methods of Evaluation:

Exams/Tests/Quizzes
Problem Solving
Skill Demonstrations

Written Assignments

Typical Assignments:

Reading:

Text Readings
Manufacturer training guides

Writing, Problem Solving or Performance:

Written evaluation and analysis of schematic diagrams Assess electrical problems encountered in lab by applying electrical theory

Other:

Required Materials Examples:

Book 1

Author: James E. Duffy	Publication Date: 2009	Edition: 7th
Title:Modera Automotive Technology	Publisher: The Goodheart-Wilcox Company , Inc	

Course Preparation:

Prerequisite(s):	AUTO 103
Co-Requisite(s):	None
Recommended:	None

Document Content Review

Target Course Skills

Condition on Enrollment

Renewed

Faculty

Gary Sornborger

Basic Content Review

Test and service automobile batteries. Test and repair automotive starters and circuits. Test and repair automotive charging devices and circuits. Test, service and repair automotive lighting systems.

COLLEGE OF THE CANYONS

AUTO 108 - Engine Performance II

Approval Date: 03/07/2008 Effective Term: Fall 2008

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 4.00
Grading Option: Letter Grade
Transferability: CSU Transferable
Course is: AA/AS Degree
Repeatability:
Contact Hours per Term:
Lecture/Discussion: *45.00*
Lab: *81.00*
Associate Degree GE Applicability: No
Recommended Class Size: 35

Discipline/Minimum Qualifications:

Auto Mechanics

Catalog Description:

Provides more in-depth study of the design and operation of fuel management systems including domestic and import feedback carburetor and fuel injection systems, electronic ignition systems used and introduces computer controlled systems. Emphasizes the correct diagnosis of and proper repair procedures for those systems.

Schedule Description:

Provides more in-depth study of the design and operation of fuel management systems including domestic and import feedback carburetor and fuel injection systems, electronic ignition systems used and introduces computer controlled systems.

Student Learning Outcome:

1. Diagnose and repair electronic ignition systems of domestic and import vehicles.
2. Assess mechanical and electronic fuel pumps for proper functioning.
3. Delineate the function of a computer processor and the types of memories it requires to control engine operation.

Course Objectives:

1. Describe the function of various emission control devices.
2. Test various emission devices for proper operation.
3. Inspect, service or replace fuel lines, hoses, pick-up tubes and tanks.
4. Assess mechanical fuel pumps for volume, pressure, vacuum ouput and evaluate fuel pump efficiency based on manufacturer's specifications.
5. Service and or replace fuel filters
6. Describe the input sensors required by a computer to control fuel system operation.
7. Evaluate open and closed-loop fuel system control.
8. Demonstrate mixture control solenoid tests on domestic and import computerized carburetors.
9. Compare and contrast the major differences between domestic and import computerized carburetor system designs.
10. Compare and contrast the function, design and location of fuel pumps, filters, and pressure and volume tests on fuel injection systems.
11. Explain the function of a turbocharger and describe the design and operation of a turbocharger and the devices used to regulate its performance.
12. Diagnose distributor less ignition systems on domestic and import vehicles.

Course Content Outline:

1. Fuel Supply Systems
a. Fuel Tanks
1. Filler tube
2. Pick-up tube and filter
3. Fuel tank ventilation
4. Rollover leakage protection
b. Fuel Lines and Hoses
c. Mechanical Fuel Pumps
1. Function
2. Design
3. Operation
4. Testing and Replacement
d. Electric Fuel Pumps
1. Design
2. Operation
3. Testing and Replacement
4. Electrical Circuits
e. Fuel Filters
1. Function
2. Location
3. Types and Design
4. Servicing and Replacement

2. Computer Controlled Carburetors
a. Need for Computer control
b. Basic Computer System Design
1. Input Sensors
2. Processor
3. Memories
4. Output Devices
5. Open and Closed-loop Control
c. Testing Computer control Carburetor Systems
1. Codes and diagnostic charts
2. Mixture control solenoid dwell
3. System performance tests
4. Carburetor overhaul procedures

3. Types of Computer Control Carburetor Systems
a. Ford
b. General Motors
c. Chrysler
d. Import

4. Fuel Injection
a. Fuel Supply System
1. Pump
2. Filters
3. Regulator
b. Throttle Body System Design
1. Throttle Body
2. Injector(s)
3. Computer Control of System Operation
c. Port Fuel Injection System Design
1. Throttle Body
2. Injectors
3. Computer Control of System Operation
d. System Testing and Service
1. Pressure testing
2. Injector replacement
3. Injector cleaning
4. Computer testing

5. Fuel Injection System Types
a. Ford
b. General Motors

c. Chrysler
d. Import

6. Turbochargers
a. Function
b. Design
c. Controls
d. Operation
e. Testing and service

Methods of Instruction:

Lab , Lecture:

Methods of Evaluation:

Exams/Tests/Quizzes
Skill Demonstrations

Assignments

Typical Assignments:

Reading:
Text Industry periodicals

Writing, Problem Solving or Performance:
Essay that compares and contrasts the various methods of fuel control utilized in domestic and import vehicles. Collect and compare the various fuel injection waveforms used in domestic and import vehicles. Skills demonstration

Other:

Required Materials Examples:

Book 1

Author: James D. Halderman and Chase D. Mitchell	Publication Date: 2006	Edition: 2nd
Title:Automotive Engine Performance	Publisher: Prentice Hall	

Book 2

Author: Ken Pickerill	Publication Date: 2004	Edition: 4th
Title:Today's Technician, Automotive Engine Performance Classroom and Shop Manual	Publisher: CENGAGE Delmar Learning	

Course Preparation:

Prerequisite(s):	AUTO 102
Co-Requisite(s):	None
Recommended:	None

Document Content Review

Target Course Skills

Condition on Enrollment

Established

Faculty

Gary Sornborger Tony Asebedo (NATEF Consultant) Audrey Green (Administrator)

Basic Content Review

1. Diagnose ignition problems with an oscilloscope 2. Apply the latest safety standards when working on ignition and fuel systems 3. Display proficient use of various electronic test equipment including meters, analyzers and diagnostic testers and scanners 4. Describe the operation of various engines, ignition, fuel and engine computer control feedback systems 5. Diagnose and repair engine, ignition, fuel and engine computer control feedback systems failures 6. Service various engine, ignition, fuel and computer control systems to industry and manufacture standards

COLLEGE OF THE CANYONS

AUTO 109 - Automotive Brake Systems

Approval Date: 02/07/2008 Effective Term: Fall 2008

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 4.00
Grading Option: Letter Grade
Transferability: CSU Transferable
Course is: AA/AS Degree
Repeatability:
Contact Hours per Term:
Lecture/Discussion: *45.00*
Lab: *81.00*
Associate Degree GE Applicability: No
Recommended Class Size: 35

Discipline/Minimum Qualifications:

Auto Mechanics

Catalog Description:

Provides the theoretical and practical application of the operation, diagnosis and repair of automotive brake systems.

Schedule Description:

Provides the theoretical and practical application of the operation, diagnosis and repair of automotive brake systems.

Student Learning Outcome:

1. Assess and repair automotive brake systems.

Course Objectives:

1. Describe the function and principles of hydraulics in automotive brake systems and components in a drum brake system.
2. Compare the design and function of drum and disc brake systems.
3. Identify the components in a disc brake system.
4. Test and analyze hydraulic components for proper operation and leaks.
5. Demonstrate the proper use of micrometers to measure brake rotors and drums.
6. Disassemble, clean and inspect brake components, and evaluate the need for repair or replacement faulty components.
7. Appraise brake rotors and drums for maximum wear and run-out.
8. Perform a proper road test to evaluate poor braking, vibration and abnormal brake pedal height.
9. Assess power assist systems, and differentiate failures between hydraulics, power assist, and the brake components.
10. Differentiate the purpose and function of Anti-Lock Brake Systems (ABS)
11. Demonstrate the proper use of tools needed to test and repair brake systems.

Course Content Outline:

1. Shop Safety
a. Hazardous materials
b. MSDS material safety data sheets

2. Brake Systems
a. Principles of operation
b. Components

3. Master Cylinders
a. Operation
b. Diagnosis
c. Servicing

4. Wheel Bearings
a. Diagnosis
b. Servicing

5. Drum Brakes
a. Operation
b. Diagnosis
c. Servicing

6. Disc Brake
a. Operation
b. Diagnosis
c. Servicing

7. Parking Brake
a. Operation
b. Diagnosis
c. Servicing

8. Machining
a. Measurement
b. Drum service
c. Rotor service

9. Power Brake Units
a. Operation
b. Diagnosis
c. Servicing

10. Antilock braking system
a. Operation
b. Diagnosis
c. Service

Methods of Instruction:

Lab , Lecture:

Methods of Evaluation:

Exams/Tests/Quizzes
Skill Demonstrations

Assignments

Typical Assignments:

Reading:

Text Handouts and Technical service bulletins

Writing, Problem Solving or Performance:

Essay that compares and contrasts the function of various hydraulic systems used in the automotive industry. Diagnose drivability complaints derived from brake systems. Skills demonstration

Other:

Required Materials Examples:

Book 1

Author: James D. Halderman and Chase D. Mitchell Publication Date: 2003 Edition: 3rd

Title:Automotive Brake Systems Publisher: Prentice Hall

Course Preparation:

Prerequisite(s):	None
Co-Requisite(s):	None
Recommended:	None

COLLEGE OF THE CANYONS

AUTO 109 - Automotive Brake Systems

Approval Date: 02/07/2008 Effective Term: Fall 2008

Department: AUTOMOTIVE TECHNOLOGY
Division: Career Technical Education
Units: 4.00
Grading Option: Letter Grade
Transferability: CSU Transferable
Course is: CSU Transferable
Repeatability: Not Repeatable
Contact Hours per Term:
Lecture/Discussion: *45.00*
Lab: *81.00*
Associate Degree GE Applicability: No
Recommended Class Size: 28
-Rationale: Safety requirements mandate smaller than 35 class size

Discipline/Minimum Qualifications:

Auto Mechanics

Catalog Description:

Provides the theoretical and practical application of the operation, diagnosis and repair of automotive brake systems.

Schedule Description:

Provides the theoretical and practical application of the operation, diagnosis and repair of automotive brake systems.

Student Learning Outcome:

1. LECTURE: Explain how to perform a proper break inspection, service, and repair.
2. LAB: Assess and repair automotive brake systems, then confirm repair by road testing.

Course Objectives:

Lecture

1. LECUTRE: Describe the function and principles of hydraulics in automotive brake systems and components in a drum brake system.
2. LECTURE: Compare the design and function of drum and disc brake systems.
3. LECTURE: Assess power assist systems, and differentiate failures between hydraulics, power assist, and the brake components.
4. LECTURE: Differentiate the purpose and function of Anti-Lock Brake Systems (ABS)
5. LECTURE: Describe safety precautions when using various tools and equipment.
6. LECTURE: Describe the function and operation of hydraulic break system.
7. LECTURE: Analyze the parameters and proper use of calipers.
8. LECTURE: Describe the effect of leaving parking break on and the damage that can occur to the rotor.

Lab

1. LAB: Identify the components in a disc brake system.
2. LAB: Test and analyze hydraulic components for proper operation and leaks.
3. LAB: Demonstrate the proper use of micrometers to measure brake rotors and drums.
4. LAB: Disassemble, clean and inspect brake components, and evaluate the need for repair or replacement faulty components.
5. LAB: Inspect brake rotors and drums for maximum wear and run-out.

6. LAB: Perform a proper road test to evaluate poor braking, vibration and abnormal brake pedal height.
7. LAB: Demonstrate the proper use of tools needed to test and repair brake systems.
8. LAB: Demonstrate the proper service procedure.
9. LAB: Demonstrate the proper diagnosis of break failure.

Course Content Outline:

LECTURE:

1. Shop Safety
a. Hazardous materials
b. MSDS material safety data sheets

2. Brake Systems
a. Principles of operation
b. Components
c. Hybrid brake sytem safety issue

3. Master Cylinders
a. Operation
b. Diagnosis

4. Wheel Bearings
a. Diagnosis

5. Drum Brakes
a. Operation
b. Diagnosis

6. Disc Brake
a. Operation
b. Diagnosis

7. Parking Brake
a. History and use
b. Operation
c. Diagnosis

8. Machining
a. Measurement
b. Drum v. Rotor service

9. Power Brake Units
a. Operation
b. Diagnosis

10. Antilock braking system (ABS)
a. pumping; effect on driver performance
a. Operation
b. Diagnosis

LAB:

1. Shop Safety
a. Hazardous materials
b. Tools and equipment
c. MSDS material safety data sheets

2. Brake Systems
a. Principles of operation
b. Road Testing
c. Components

3. Master Cylinders
a. Operation

b. Diagnosis
c. Servicing

4. Wheel Bearings
a. Operation
b. Types - sealed and semicable
c. Diagnosis
d. Servicing

5. Drum Brakes
a. Operation - venear calipers
b. Diagnosis
c. Servicing

6. Disc Brake
a. Operation - parts and function
b. Diagnosis - wear and failure
c. Servicing - inspection procedures

7. Parking Brake
a. Operation
b. Diagnosis - lack of friction material
c. Servicing

8. Machining - drums, roters, lathes, on the car lathe
a. Measurement - specifications following Mitchell on Demand and allDATA
b. Drum service
c. Rotor service

9. Power Brake Units
a. Operation - vacuum assist v. hydrolic assist
b. Diagnosis
c. Servicing - overhauling

10. Antilock braking sys tem (ABS)
a. Operation
b. Diagnosis - use of scanner
c. Service

Methods of Instruction:
Lab , Lecture:

Methods of Evaluation:
Exams/Tests/Quizzes
Skill Demonstrations

__Assignments

Typical Assignments:
Reading:

Text Handouts and Technical service bulletins

Writing, Problem Solving or Performance:

Lecture: Essay that compares and contrasts the function of various hydraulic systems used in the automotive industry.

Lab: Diagnose drivability complaints derived from brake systems.

Other:

Required Materials Examples:

Book 1

Author: Johanson, Chris	Publication Date: 2005	Edition: 1
Title:Modern Automotive Technology Shop Manual	Publisher: Goodhear-Wilcox Company, Inc.	

Book 2

Author: Duffy, James	Publication Date: 2014	Edition: 8th
Title:Modern Automotive Technology	Publisher: Goodheart-Wilcox Company	

Course Preparation:

Prerequisite(s):	None
Co-Requisite(s):	None
Recommended:	None