

Introduction to Automotive Technology

Course Design

2005-2006

Course Information

Organization	Eastern Arizona College
Division	ITE
Course Number	AUT 101
Title	Introduction to Automotive Technology
Credits	4
Developed by	Brian Coppola
Lecture/Lab Ratio	3 hours. Lecture 3 hours Lab
Transfer Status	Elective to ASU, DEC (CTE) to NAU, Elective to UofA
Activity Course	No
CIP Code	47.0604
Assessment Mode	Pre/Post Test; 50 Questions for 100 Points Total
Semester Taught	Offered Upon Request
GE Category	None
Separate Lab	Yes
Awareness Course	No
Intensive Writing Course	No

Prerequisites

None

Educational Value

This course is designed to reinforce and apply information, processes, and ideas gained in other courses. The major intent of this course is to enhance the individuals abilities to basic scheduled service on the automotive vehicle.

Goals

The goal of this course is to provide the student with information and experience in maintaining his/her automobile.

Description

Provides an in-depth study of basic automotive vehicle systems. This course provides basic operational knowledge, care and maintenance of engine, fuel, ignition, suspension, brakes, electrical, and drive train systems.

Textbooks

John Remling & Donald Patten. *Automotive Service Basics*. Edition: 3 rd Edition. Publisher: Prentice Hall. Year: Newest Revision. Required

Competencies and Performance Standards

1. Apply proper safety procedures and processes.

Learning objectives

What you will learn as you master the competency:

- a. Acquaint self with shop environment and hazards.
- b. Acquaint self with emergency procedures and policy.
- c. Accept responsibility for personal well-being and practice and follow safety guidelines.
- d. Acquaint self with material safety data sheets and chemical used in shop.

Performance Standards

Competence will be demonstrated:

- o when learner completes safety assignments and written exam at a satisfactory level.

Criteria - Performance will be satisfactory when:

- o learner observes and practices safety procedures.

2. Perform manufacturer's recommended vehicle lubrication and inspection service.

Learning objectives

What you will learn as you master the competency:

- a. Demonstrate the ability to change oil, lube chassis, rotate and balance tires and inspect fluid, tires and inspect fluid, tires and belts.

Performance Standards

Competence will be demonstrated:

- o When learner completes NATEF aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
- o When the learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

Criteria - Performance will be satisfactory when:

- o learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan.
- o learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the NATEF task requirement listed in related learning plan.
- o learner actively participates in the NATEF task requirements listed in the related learning plan.
- o learner attends required class and lab sessions and shows up on time.

3. Perform manufacturer's recommended engine performance preventative maintenance inspection and service.

Learning objectives

What you will learn as you master the competency:

- a. Demonstrate the ability to identify needed scheduled service for various vehicles.
- b. Demonstrate the ability to replace spark plugs, filters, check fluids, check tires and belts, and check ignition timing.
- c. Demonstrate the ability to identify needed repairs to under hood and under car components.

Performance Standards

Competence will be demonstrated:

- o When learner completes NATEF aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
- o When the learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

Criteria - Performance will be satisfactory when:

- o learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan.
- o learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the NATEF task requirement listed in related learning plan.
- o learner actively participates in the NATEF task requirements listed in the related learning plan.
- o learner attends required class and lab sessions and shows up on time.

4. Perform recommended drive belt and cooling systems service.

Learning objectives

What you will learn as you master the competency:

- a. Demonstrate the ability to replace vehicle drive belts.
- b. Demonstrate the ability to test, flush and replace engine cooling system components.

Performance Standards

Competence will be demonstrated:

- o When learner completes NATEF aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
- o When the learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

Criteria - Performance will be satisfactory when:

- o learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan.
- o learner provides acceptable oral and/or written responses to questions and/or situations

asked by the instructor, while working on the NATEF task requirement listed in related learning plan.

- o learner actively participates in the NATEF task requirements listed in the related learning plan.
- o learner attends required class and lab sessions and shows up on time.

5. Perform safety and lighting systems inspection.

Learning objectives

What you will learn as you master the competency:

- a. Demonstrate the ability to identify safety problems with lighting systems, body systems and various safety warning devices.

Performance Standards

Competence will be demonstrated:

- o When learner completes NATEF aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
- o When the learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

Criteria - Performance will be satisfactory when:

- o learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan.
- o learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the NATEF task requirement listed in related learning plan.
- o learner actively participates in the NATEF task requirements listed in the related learning plan.
- o learner attends required class and lab sessions and shows up on time.

6. Perform basic electrical system inspection and component replacement.

Learning objectives

What you will learn as you master the competency:

- a. Demonstrate the ability to test for voltage and battery's state of charge.
- b. Demonstrate the ability to identify and replace electrical circuit protection devices.
- c. Demonstrate the ability to identify component locations and repair lighting systems components.

Performance Standards

Competence will be demonstrated:

- o When learner completes NATEF aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
- o When the learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

Criteria - Performance will be satisfactory when:

- o learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan.
- o learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the NATEF task requirement listed in related learning plan.
- o learner actively participates in the NATEF task requirements listed in the related learning plan.
- o learner attends required class and lab sessions and shows up on time.

7. Acquire basic electrical testing and measurement skills.

Learning objectives

What you will learn as you master the competency:

- a. Demonstrate the ability to interpret DVOM reading related to voltage, resistance and current.
- b. Demonstrate the ability to identify lighting system electrical circuit faults related to grounds, shorts and opens.
- c. Demonstrate basic ability to interpret information on electrical schematic.

Performance Standards

Competence will be demonstrated:

- o When the learner performs the priority NATEF task listed in the related learning plan. (The task must be completed with limited supervision - entry level).
- o When learner completes NATEF aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).

Criteria - Performance will be satisfactory when:

- o learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on NATEF task requirement listed in related learning plan.
- o learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan.
- o learner attends required class and lab sessions and shows up on time.

8. Perform basic ignition and fuel system service and repairs.

Learning objectives

What you will learn as you master the competency:

- a. Demonstrate the ability to set ignition timing.
- b. Demonstrate an ability to replace ignition system components.
- c. Demonstrate an ability to test fuel delivery system.
- d. Demonstrate an ability to replace fuel system components

Performance Standards

Competence will be demonstrated:

- o When the learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).
- o When learner completes NATEF aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).

Criteria - Performance will be satisfactory when:

- o learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the NATEF task requirement listed in related learning plan.
- o learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan.
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- o learner attends required class and lab sessions and shows up on time.

9. Perform brake, suspension and steering systems safety inspection and repair.

Learning objectives

What you will learn as you master the competency:

- a. Demonstrate the ability to inspect and repair drum brake components.
- b. Demonstrate the ability to inspect and repair disc brake components.
- c. Identify worn out suspension components.
- d. Identify worn steering systems components.

Performance Standards

Competence will be demonstrated:

- o When learner completes NATEF aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
- o When the learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

Criteria - Performance will be satisfactory when:

- o learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan.
- o learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the NATEF task requirement listed in related learning plan.
- o learner actively participates in the NATEF task requirements listed in the related learning plan.
- o learner attends required class and lab sessions and shows up on time.

10. Perform transmission and transaxle adjustments and preventative maintenance service.

Learning objectives

What you will learn as you master the competency:

- a. Demonstrate the ability to service transmission's filter and fluid.

Performance Standards

Competence will be demonstrated:

- o When learner completes NATEF aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
- o When the learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

Criteria - Performance will be satisfactory when:

- o learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan.
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- o learner attends required class and lab sessions and shows up on time.

Types of Instruction

Classroom Presentation

Lab

Simulated or Actual Work Experience

Learning Plan

Safety

Overview

In this learning plan you will develop the knowledge needed to work safely in a shop environment. You will learn safety procedures, the location of safety equipment, and the safety features of various shop equipment. The instruction will cover general shop safety processes, fire safety, battery safety, lifting procedures, and health-related hazards.

1. Apply proper safety procedures and processes.

Learning Activities

- ____1. Complete a worksheet/assignment sheet.

- ____2. Collect a current article that relates to concepts and issues about which you are studying.

- ____3. Listen and observe a lecture covering safety procedures and practice - review a safety and hazards video.

- ____4. Operate hoist, floor jack (jack stands) and any equipment needed during assigned lab activities.

- ____5. Identify location of safety equipment, first aid kit, phone, fire blanket, fire extinguishers, exits, light switches and vents.

Assessment Activities

- ____1. Participate in safety discussion.
- ____2. Complete activities in lesson.
- ____3. Complete written safety test.

Learning Plan

Lube and Inspection

Overview

To perform manufacturer's recommended vehicle lubrication and inspection service.

2. **Perform manufacturer's recommended vehicle lubrication and inspection service.**

Learning Activities

- ____1. Check, adjust, and determine the condition of all vehicle fluids.
- ____2. Change engine oil and filter and air and breather filters. (NATEF I D 13, VIII E 2)
- ____3. Inspect for unusual tire wear, rotate tires and torque lug nuts. (NATEF V B 7, IV D 1, 2, 4, and 9)
- ____4. Balance a tire. (NATEF IV D 7)

Assessment Activities

- ____1. Participate in discussion of subject matter. Listen, take note, watch demonstration and discuss material in lesson
- ____2. Complete all assigned activities. Complete lube work activity and job sheet.

Learning Plan

Engine Preventative Maintenance

Overview

To perform manufacturer's recommended engine preventative maintenance.

3. **Perform manufacturer's recommended engine performance preventative maintenance inspection and service.**

Learning Activities

- ____1. Check, adjust, and determine the condition of all vehicle fluids.
- ____2. Replace a fuel filter. (NATEF VIII D 6)
- ____3. Measure engine idle speed and adjust. (NATEF VIII D 12 and 13)
- ____4. Remove, replace, and recondition spark plugs. (NATEF VIII C 5)
- ____5. Inspect and replace spark plug wires. (NATEF VIII C 5)
- ____6. Inspect ignition coil. (NATEF VIII C 6)
- ____7. Check and adjust dwell and ignition timing (where applicable) (NATEF VIII C 7)

Assessment Activities

- ____1. Participate in discussion of subject matter. Listen, take note, watch demonstration and discuss material in lesson
- ____2. Complete all assigned activities. Complete 30,000 mile service / tune-up
- ____3. Complete all required test covering preventive maintenance and operational theory behind the internal combustion engine..

Learning Plan

Drive Belt and Cooling Systems

Overview

To perform recommended drive belt and cooling systems service.

4. Perform recommended drive belt and cooling systems service.

Learning Activities

- ____1. Remove, replace and adjust drive belts. (NATEF I D 4)

- ____2. Replace engine coolant and flush the cooling system. (NATEF I D 7, VII C 5 and 6)

- ____3. Remove and replace engine and heater hoses. (NATEF I D 5 and VII C 3)

- ____4. Determine the condition of the engine coolant. (NATEF I D 7, VII C 5)

- ____5. Replace thermostat. (NATEF I D 6, VII C 4)

- ____6. Pressure test cooling system components. (NATEF I D 3, VII C 2)

Assessment Activities

- ____1. Participate in discussion of subject matter. Listen, take note, watch demonstration and

discuss material in lesson

- _____2. Complete all assigned activities. Complete work activity and job sheet covering cooling system, and accessory belt service & inspection.
- _____3. Complete all required test covering cooling and lube systems.

Learning Plan

Safety and Lighting Systems Inspection

Overview

To perform safety and lighting systems inspection.

5. **Perform safety and lighting systems inspection.**

Learning Activities

- ____1. Inspect tires and tire wear pattern. (P-1 NATEF IV D 1 & 2)

- ____2. Inspect brake components for hydraulic leaks and wear on friction components. (P-1 NATEF V A 5, V B 2 & V C 2)

- ____3. Inspect front steering linkage components. (P-1 NATEF IV C 2)

- ____4. Inspect headlights, exterior running lights, brake lights, and trunk signals for proper operation. (P-1 NATEF VI E 2 & 3)

- ____5. Inspect horn and wiper operation and determine any needed repairs. (P-3 NATEF VI G 1 & 2)

Assessment Activities

- _____1. Participate in discussion of subject matter. Listen, take note, watch demonstration and discuss material in lesson
- _____2. Complete all assigned activities. Complete safety and lighting inspections / fill out job sheet

Learning Plan

Basic Electrical System

Overview

To perform basic electrical system inspection and component replacement.

6. Perform basic electrical system inspection and component replacement.

Learning Activities

- ____1. Clean and service a battery. (NATEF VI B 7)

- ____2. Determine the condition of and charge a battery. (NATEF VI B 1 and 5)

- ____3. Start a vehicle using jumper cables. (NATEF VI B 7)

- ____4. Determine the condition of and change a fuse/circuit breaker/fusible link. (NATEF VI A 9)

- ____5. Replace a flasher. (NATEF VI A 10)

- ____6. Replace light bulbs (small and headlight). (NATEF VI E 2)

Assessment Activities

- ____1. Participate in discussion of subject matter. Listen, take note, watch demonstration and

discuss material in lesson

- _____2. Complete all assigned activities. Complete CBI group activity covering electrical terms and basic electrical measurements.

Learning Plan

Basic Electrical Diagnosis

Overview

In this learning plan you will develop the knowledge needed to test and identify lighting circuit electrical faults. You will learn basic multimeter usage and how to interpret the meter's readings. You will use an electrical schematic to identify electrical faults caused by poor grounds, shorts, and opens.

7. Acquire basic electrical testing and measurement skills.

Learning Activities

- ____1. Complete basic electrical computer-based or written instructional module.

- ____2. Use a multimeter to measure voltage, current, and resistance and record your results.

- ____3. Listen and observe techniques demonstrated related to diagnosing electrical lighting circuits faults.

- ____4. Identify current path for the operation of an electrical lighting circuit.

- ____5. Test and isolate lightning circuit electrical faults on shop vehicle.

Assessment Activities

- ____1. Participate in electrical basics discussions.

- ____2. Complete worksheet related to measuring voltage, current and resistance.
- ____3. Complete module related to taking electrical measurements on circuit board and live vehicle.
- ____4. Complete hands-on activity related to reading a basic electrical schematic.
- ____5. Complete written test

Learning Plan

Ignition & fuel systems

Overview

Provide an understanding of basic service on vehicle ignition and fuel delivery systems.

8. Perform basic ignition and fuel system service and repairs.

Learning Activities

- ____1. Check and set timing if needed. (P1 NATEF VIII C 7)

- ____2. Check and set dwell where applicable

- ____3. Replace ignition system components (P2 NATEF VIII C 3,4,5,6,8,9)

- ____4. Check fuel systems delivery (P2 NATEF VIII D 5 & 7)

- ____5. Replace fuel delivery systems components (P1 NATEF VIII D 6)

Assessment Activities

- ____1. Participate in discussion of subject matter. Listen, take note, watch demonstration and discuss material in lesson

- ____2. Complete all assigned activities. Complete group and individualized activity covering ignition and fuel systems inspection and testing process.

____3. Complete test covering basic electrical, ignition and fuel systems.

Learning Plan

Brake, Suspension and Steering Systems Safety Inspection

Overview

To perform brake, suspension and steering systems safety inspection and repair.

9. Perform brake, suspension and steering systems safety inspection and repair.

Learning Activities

- ____1. Re-pack wheel bearings. (NATEF V E 2 & IV B 3-2)

- ____2. Inspect and replace friction components on drum and disc brake system. (NATEF V B 2, V C 2, 3, and 6)

- ____3. Bleed a brake system. (NATEF V A 11)

- ____4. Determine the condition of an replace shock absorbers. (NATEF IV B 3-1)

- ____5. Perform prealignment Inspection & check tie rod ends, center links and ball joints for wear. (NATEF IV C 2)

- ____6. Rotate tires according to mfg. requirements. (P-1 NATEF IV D 4)

- ____7. Balance wheel and tire assembly. (P-1 NATEF IV D 7)

- ____8. Dismount, inspect, repair and remount tire on wheel. (P-2 NATEF IV D 8)

- ____9. Install wheel assembly on vehicle and torque lugs. (P-1 NATEF IV D 9)

Assessment Activities

- ____1. Participate in discussion of subject matter. Listen, take note, watch demonstration and discuss material in lesson
- ____2. Complete all assigned activities. Complete steering & suspension inspection job sheets, perform brake service
- ____3. Complete all required test covering brake, steering and suspension system service.

Learning Plan

Transmission/Transaxle Maintenance

Overview

To perform transmission and transaxle adjustments and maintenance.

10. Perform transmission and transaxle adjustments and preventative maintenance service.

Learning Activities

____1. Replace automatic transmission/transaxle fluid and filter. (NATEF II B 2)

Assessment Activities

- ____1. Participate in discussion of subject matter. Listen, take note, watch demonstration and discuss material in lesson
- ____2. Complete all assigned activities. Complete job sheet covering transmission service.
- ____3. Complete all required quiz covering power train.

Grading Information

Grading Rationale

Grading Weights

Lab=45%

Class (Includes Test and Assignments)=45%

Final Exam (Post Test is the Final)=10%

Grading Methods

Class score calculation-

Quizzes, assignments and job sheet points shall be added and carry a weight equal to one test score.

All exams except the final shall have equal weight (test scores averaged) and used in class score calculations.

The final (post test) will be worth at least 10% of the overall final grade calculation.

Lab score calculation-

Instructor should evaluate each student's work habits using lab time card.

Each student should be evaluated on productivity and progress on task requirements, working in a professional manner, clean-up and safe work habits. Instructor is also required to evaluate each student's skill level in achieving the NATEF task requirement outlined in the various learning plans.

Instructors are encouraged to reward students for showing up on time and attending each class and lab session. This can be done by requiring students to make arrangements with the instructor to make-up any lost time prior to missed day. All students need to notify the instructor of sick days through voice mail, etc. on the day of sickness. Instructors should not allow for any work to be turned in late or any test made up without some type of deduction for late assignments/test. Suggested deduction 50% of original score.

Grading Scale

A	90-100%
B	80-89.9%
C	70-79.9%
D	60-69.9%
F	0-59.9%

Pass/Fail A non-major student may choose to have a grade of P or F rather than a letter grade. A grade of P will require that the student receive a percentage grade of at least 68%. A grade less than this will result in a grade of F.