

Introduction to Automotive Technology

Course Design

2001-2002

Course Information

Organization:	Eastern Arizona College
Division:	ITE
Course Number:	AUT 101
Title:	Introduction to Automotive Technology
Credits:	3
Developed by:	Brian Coppola
Lecture/Lab Ratio:	2 Lecture/ 3 Lab
Transfer Status:	Elective to ASU, DEC (VTE) to NAU, Elective to U of A
Extended Registration	
Class:	No
CIP Code:	47.0604
Assessment Mode:	Pre-Post Test; 50 questions, 100 points
Awareness Course:	No
Intensive Writing	
Course:	No
Prerequisites:	1. 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:	1. 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. <i>Automotive Service Basics</i> . 3rd. Prentice Hall, 1997.
Supplies:	safety glasses

Competencies and Performance Standards

1. Apply proper safety procedures and processes.			
<i>Domain--Psychomotor</i>	<i>Level--Practice</i>	<i>Importance--Important</i>	<i>Difficulty--Medium</i>
<p>Criteria--Criteria - Performance will be satisfactory when:</p> <ul style="list-style-type: none"> <input type="checkbox"/> learner observes and practices safety procedures. 	<p>Conditions--Competence will be demonstrated:</p> <ul style="list-style-type: none"> <input type="checkbox"/> when learner completes safety assignments and written exam at a satisfactory level. 	<p>Learning Objectives:</p> <ul style="list-style-type: none"> 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. 	
2. Perform manufacturer's recommended vehicle lubrication and inspection service.			
<i>Domain--Psychomotor</i>	<i>Level--Practice</i>	<i>Importance--Important</i>	<i>Difficulty--Medium</i>
<p>Criteria--Criteria - Performance will be satisfactory when:</p> <ul style="list-style-type: none"> <input type="checkbox"/> learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan. <input type="checkbox"/> 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. <input type="checkbox"/> learner actively participates in the NATEF task requirements listed in the related learning plan. <input type="checkbox"/> learner attends required class and lab sessions and shows up on time. 	<p>Conditions--Competence will be demonstrated:</p> <ul style="list-style-type: none"> <input type="checkbox"/> 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). <input type="checkbox"/> When the learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level). 	<p>Learning Objectives:</p> <ul style="list-style-type: none"> a. Demonstrate the ability to change oil, lube chassis, rotate and balance tires and inspect fluid, tires and inspect fluid, tires and belts. 	

<p>3. Perform manufacturer's recommended engine performance preventative maintenance inspection and service.</p>			
<p><i>Domain--Psychomotor</i> <i>Level--Practice</i> <i>Importance--Important</i> <i>Difficulty--Medium</i></p>			
<p>Criteria--Criteria - Performance will be satisfactory when:</p> <ul style="list-style-type: none"> <input type="checkbox"/> learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan. <input type="checkbox"/> 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. <input type="checkbox"/> learner actively participates in the NATEF task requirements listed in the related learning plan. <input type="checkbox"/> learner attends required class and lab sessions and shows up on time. 	<p>Conditions--Competence will be demonstrated:</p> <ul style="list-style-type: none"> <input type="checkbox"/> 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). <input type="checkbox"/> When the learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level). 	<p>Learning Objectives:</p> <ul style="list-style-type: none"> 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. 	
<p>4. Perform recommended drive belt and cooling systems service.</p>			
<p><i>Domain--Psychomotor</i> <i>Level--Practice</i> <i>Importance--Important</i> <i>Difficulty--Medium</i></p>			
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5. Perform safety and lighting systems inspection.		
<i>Domain--Psychomotor</i>	<i>Level--Practice</i>	<i>Importance--Important</i> <i>Difficulty--Medium</i>
<p>Criteria--Criteria - Performance will be satisfactory when:</p> <ul style="list-style-type: none"> <input type="checkbox"/> learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan. <input type="checkbox"/> 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. <input type="checkbox"/> learner actively participates in the NATEF task requirements listed in the related learning plan. <input type="checkbox"/> learner attends required class and lab sessions and shows up on time. 	<p>Conditions--Competence will be demonstrated:</p> <ul style="list-style-type: none"> <input type="checkbox"/> 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). <input type="checkbox"/> When the learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level). 	<p>Learning Objectives:</p> <ul style="list-style-type: none"> a. Demonstrate the ability to identify safety problems with lighting systems, body systems and various safety warning devices.
6. Perform brake, suspension and steering systems safety inspection and repair.		
<i>Domain--Psychomotor</i>	<i>Level--Practice</i>	<i>Importance--Important</i> <i>Difficulty--Medium</i>
<p>Criteria--Criteria - Performance will be satisfactory when:</p> <ul style="list-style-type: none"> <input type="checkbox"/> learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan. <input type="checkbox"/> 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. <input type="checkbox"/> learner actively participates in the NATEF task requirements listed in the related learning plan. <input type="checkbox"/> learner attends required class and lab sessions and shows up on time. 	<p>Conditions--Competence will be demonstrated:</p> <ul style="list-style-type: none"> <input type="checkbox"/> 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). <input type="checkbox"/> When the learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level). 	<p>Learning Objectives:</p> <ul style="list-style-type: none"> a. Demonstrate the ability to inspect 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.

7. Perform transmission and transaxle adjustments and preventative maintenance service.		
<i>Domain--Psychomotor</i>	<i>Level--Practice</i>	<i>Importance--Important</i>
<p>Criteria--Criteria - Performance will be satisfactory when:</p> <ul style="list-style-type: none"> <input type="checkbox"/> learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan. <input type="checkbox"/> 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. <input type="checkbox"/> learner actively participates in the NATEF task requirements listed in the related learning plan. <input type="checkbox"/> learner attends required class and lab sessions and shows up on time. 	<p>Conditions--Competence will be demonstrated:</p> <ul style="list-style-type: none"> <input type="checkbox"/> 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). <input type="checkbox"/> When the learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level). 	<p>Learning Objectives:</p> <ul style="list-style-type: none"> a. Demonstrate the ability to service transmission's filter and fluid.
8. Perform basic electrical system inspection and component replacement.		
<i>Domain--Psychomotor</i>	<i>Level--Practice</i>	<i>Importance--Important</i>
<p>Criteria--Criteria - Performance will be satisfactory when:</p> <ul style="list-style-type: none"> <input type="checkbox"/> learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan. <input type="checkbox"/> 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. <input type="checkbox"/> learner actively participates in the NATEF task requirements listed in the related learning plan. <input type="checkbox"/> learner attends required class and lab sessions and shows up on time. 	<p>Conditions--Competence will be demonstrated:</p> <ul style="list-style-type: none"> <input type="checkbox"/> 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). <input type="checkbox"/> When the learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level). 	<p>Learning Objectives:</p> <ul style="list-style-type: none"> 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.

9. Perform basic ignition and fuel system service and repairs.			
<i>Domain--Affective</i>	<i>Level--Responding</i>	<i>Importance--</i>	<i>Difficulty--</i>
<p>Criteria—Criteria - Performance will be satisfactory when:</p> <ul style="list-style-type: none"> <input type="checkbox"/> 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. <input type="checkbox"/> learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan. <input type="checkbox"/> learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan. <input type="checkbox"/> learner attends required class and lab sessions and shows up on time. 	<p>Conditions—Competence will be demonstrated:</p> <ul style="list-style-type: none"> <input type="checkbox"/> When the learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level). <input type="checkbox"/> 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). 	<p>Learning Objectives:</p> <ul style="list-style-type: none"> a. Demonstrate the ability to set ignition timing. b. Demonstrate an ability to replace ignition system components. c. Demonstrate an ability to replace fuel system components 	

Types of Instruction

Classroom Presentation

Lab

Simulated or Actual Work Experience

Grading Policy

Evaluation Methods: 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:

Grade	Requirement
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.

Learning Plans

Learning Plan 1-- 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.

Competency: 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.

Performance Assessment Activities:

- _____ 1. Participate in safety discussion.
- _____ 2. Complete activities in lesson.
- _____ 3. Complete written safety test.

Learning Plan 2-- Lube and Inspection

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

Competency: 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)

**Performance
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 3-- Engine Preventative Maintenance

Overview: To perform manufacturer's recommended engine preventative maintenance.

Competency: 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. (NATEF VIII D 12 and 13)
- _____ 4. Remove, replace, and recondition spark plugs. (NATEF VIII C 5)
- _____ 5. Inspect (visually) and replace spark plug wires. (NATEF VIII C 5)
- _____ 6. Check and adjust ignition timing (where applicable) (NATEF VIII C 7)

**Performance
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 4-- Drive Belt and Cooling Systems

Overview: To perform recommended drive belt and cooling systems service.

Competency: 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)

Performance 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 5-- Safety and Lighting Systems Inspection

Overview: To perform safety and lighting systems inspection.

Competency: 5. Perform safety and lighting systems inspection.

Learning Activities:

- _____ 1. Perform light systems safety inspection.

Performance 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 6-- Brake, Suspension and Steering Systems Safety Inspection

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

Competency: 6. Perform brake, suspension and steering systems safety inspection and repair.

Learning Activities:

- _____ 1. Dismount, patch and mount a tire. (NATEF IV D 8)
- _____ 2. Re-pack wheel bearings. (NATEF V E 2)
- _____ 3. Inspect and replace friction components on disc brake system. (NATEF V B 2, V C 2, 3, and 6)
- _____ 4. Bleed a brake system. (NATEF V A 11)
- _____ 5. Inspect brake components for hydraulic leaks and wear on friction components. (NATEF V A 5, V B 2 and 5, V C 2)
- _____ 6. Determine the condition of an replace shock absorbers. (NATEF IV B 3-1)
- _____ 7. Inspect tie rod ends, center links and ball joints for wear. (NATEF IV B 5, IV 19 and 20)

**Performance
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 7-- Transmission/Transaxle Maintenance

Overview: To perform transmissison and transaxle adjustments and maintenance.

Competency: 7. **Perform transmission and transaxle adjustments and preventative maintenance service.**

Learning Activities:

- _____ 1. Replace automatic transmissison/transaxle fluid and filter. (NATEF II B 2)

**Performance
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.

Learning Plan 8-- Basic Electrical System

Overview: To perform basic electrical system inspection and component replacement.

Competency: 8. **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 7)
- ___ 4. Determine the condition of and change a fuse/circuit breaker/fusible link. (NATEF VI A 9)
- ___ 5. Replace a flasher. (NATEF VI 10)
- ___ 6. Replace light bulbs (small and headlight). (NATEF VI E 2)

Performance 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 9-- Ignition & fuel systems

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

Competency: 9. **Perform basic ignition and fuel system service and repairs.**

Learning Activities:

- ___ 1. Check and set timing if needed.
- ___ 2. Replace ignition system components
- ___ 3. Replace fuel delivery systems components

Performance 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.