

# EASTERN ARIZONA COLLEGE

## Automatic Transmissions

Course Design  
2017-2018

**Course Information**

**Division** Industrial Technology Education  
**Course Number** AUT 230  
**Title** Automatic Transmissions  
**Credits** 4  
**Developed by** Brian Coppola  
**Lecture/Lab Ratio** 2 Lecture/4 Lab

**Transfer Status**

ASU	NAU	UA
OMT Dept Elective	CTE Departmental Elective	Non Transferable

**Activity Course** No  
**CIP Code** 47.0604  
**Assessment Mode** Pre/Post Test (25 Questions/100 Points)  
**Semester Taught** Fall semester in odd-numbered years  
**GE Category** None  
**Separate Lab** No  
**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 individual's abilities to work with and diagnosis items related to automatic transmissions/transaxles.

**Description**

This course teaches operating principles of modern automatic transmissions and transaxles. Course includes diagnosis, maintenance, testing, repair, and basic information on computerized power train control systems. This course prepares students for the ASE certification test on automatic transmissions/transaxles.

**Supplies**

Safety glasses

## **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 in completing safety assignments and written exam at a satisfactory level

*Criteria - Performance will be satisfactory when:*

- o learner observes and practices safety procedures

### **2. Diagnose automatic transmission or transaxle for mechanical, hydraulic, and electrical control system concerns using a strategy-based process. (NATEF II A)**

#### **Learning objectives**

*What you will learn as you master the competency:*

- a. Perform troubleshooting process to include verifying customer concern, preliminary inspection, and transmission performance tests.
- b. Perform troubleshooting process on the transmission's electrical, mechanical, and hydraulic systems.

#### **Performance Standards**

*Competence will be demonstrated:*

- o in completing NATEF aligned assignments 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 through performing 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 requirements 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. Diagnose automatic transmission or transaxle for unusual vibrations, noise, and fluid usage concerns using a strategy-based process. (NATEF II A)**

#### **Learning objectives**

*What you will learn as you master the competency:*

- a. Determine root cause for various vehicle noise, vibration, fluid linkages, and operational

concerns.

**Performance Standards**

*Competence will be demonstrated:*

- in completing NATEF aligned assignments and job sheets listed in the related learning plan (The assignment and job sheets must be completed at a satisfactory level to the instructor)
- through performing 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:*

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

**4. Perform automatic transmission or transaxle maintenance and adjustments according to manufacturer requirements. (NATEF II B)**

**Learning objectives**

*What you will learn as you master the competency:*

- a. Perform linkage adjustments and transmission service.

**Performance Standards**

*Competence will be demonstrated:*

- in completing NATEF aligned assignments and job sheets listed in the related learning plan (The assignment and job sheets must be completed at a satisfactory level to the instructor)
- through performing 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:*

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

**5. Perform in-vehicle transmission or transaxle component repairs. (NATEF II C)**

**Learning objectives**

*What you will learn as you master the competency:*

- a. Perform repairs on transmission and transaxle related to fluid leaks, hose linkages, cables, mounts, and shift control devices.

### **Performance Standards**

*Competence will be demonstrated:*

- in completing NATEF aligned assignments and job sheets listed in the related learning plan (The assignment and job sheets must be completed at a satisfactory level to the instructor)
- through performing 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:*

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

## **6. Perform off-vehicle transmission or transaxle component overhaul and repairs. (NATEF II D)**

### **Learning objectives**

*What you will learn as you master the competency:*

- a. Perform complete transmission or transaxle overhaul and repair process according to recommended manufacturer procedures.

### **Performance Standards**

*Competence will be demonstrated:*

- in completing NATEF aligned assignments and job sheets listed in the related learning plan (The assignment and job sheets must be completed at a satisfactory level to the instructor)
- through performing 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:*

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

### **Types of Instruction**

Classroom Presentation

Lab

Individualized/Independent Study

Simulated or Actual Work Experience

## **Grading Information**

### **Grading Rationale**

Lab=45%

Class (Includes Test and Assignments)=45%

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

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%

C 70% - 79%

D 60% - 69%

F Below 60%

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 70%. A grade less than this will result in a grade of F.

## **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 practices - 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

### General Transmission and Transaxle Diagnosis

#### Overview

To be able to diagnose transmission or transaxle problems.

#### 2. Diagnose automatic transmission or transaxle for mechanical, hydraulic, and electrical control system concerns using a strategy-based process. (NATEF II A)

#### Learning Activities

- \_\_\_\_ 1. Identify and interpret transmission concern and assure proper engine operation. ( P-1 NATEF II A 1)
  
- \_\_\_\_ 2. Perform pressure tests. (P-1 NATEF II A 3)
  
- \_\_\_\_ 3. Perform lock-up converter system tests. (P-2 NATEF II A 4)
  
- \_\_\_\_ 4. Identify cause of electronic, mechanical, hydraulic, vacuum control system concerns. (P-1 NATEF II A 5)

#### Assessment Activities

- \_\_\_\_ 1. Participate in discussion of subject matter. Listen, take notes, complete computerized activity related to hydraulic operation, and discuss material.
- \_\_\_\_ 2. Complete assignment sheets in lesson. AS1-L2-UII, AS1-L2-UII, AS1-L4-UII, AS1-L1-UII, AS2-L1-UII

## **Learning Plan**

### **General Transmission and Transaxle Diagnosis II**

#### **Overview**

To further diagnose transmission and transaxle problems.

- 3. Diagnose automatic transmission or transaxle for unusual vibrations, noise, and fluid usage concerns using a strategy-based process. (NATEF II A)**

#### **Learning Activities**

- \_\_\_\_ 1. Identify cause of unusual fluid usage, level, and condition concerns. (P-1 NATEF II A 2)
  
- \_\_\_\_ 2. Identify cause of noise and vibration concerns. (P-3 NATEF II A 6)

#### **Assessment Activities**

- \_\_\_\_ 1. Participate in discussion of subject matter. Listen, take notes, and discuss evaluating transmission concerns and general repairs.
- \_\_\_\_ 2. Complete job sheets in lesson. JS1-L1-UIII, JS2-L1-UIII, JS3-L1-UIII, JS1-L2-UII, JS2-L2-UIII, JS3-L2-UIII
- \_\_\_\_ 3. Complete written test covering automatic transmission/transaxle operational theory and basic diagnosis.



## Learning Plan

### Transmission and Transaxle Maintenance and Adjustment

#### Overview

To accurately perform transmission and transaxle maintenance and adjustments.

#### 4. Perform automatic transmission or transaxle maintenance and adjustments according to manufacturer requirements. (NATEF II B)

#### Learning Activities

- \_\_\_\_ 1. Inspect, adjust, or replace throttle (TV) linkages or cables, check gear select indicator (as applicable). (P-1 NATEF II B 1)
  
- \_\_\_\_ 2. Service transmission; perform visual inspection; replace fluids and filters. (P-1 NATEF II B 2)

#### Assessment Activities

- \_\_\_\_ 1. Participate in discussion of subject matter. Listen, take notes, watch demonstration
- \_\_\_\_ 2. Complete assignment and job sheets in lesson. AS1-L1-UIV, AS2-L1-UIV, AS3-L1-UIV, AS4-L1-UIV, AS5-L1-UIV & JS1-L1-UIV, JS2-L1-UIV, JS3-L1-UIV, JS4-L1-UIV
- \_\_\_\_ 3. Complete written test covering transmission adjustments and service.

## Learning Plan

### In-Vehicle Transmission and Transaxle Repair

#### Overview

To perform in-vehicle transmission and transaxle vehicle repairs.

#### 5. Perform in-vehicle transmission or transaxle component repairs. (NATEF II C)

#### Learning Activities

- \_\_\_\_ 1. Inspect, adjust or replace (as applicable) vacuum modulator and inspect and repair or replace lines and hoses. (P-3 NATEF II C 1)
  
- \_\_\_\_ 2. Inspect, repair, and replace governor assembly. (P-3 NATEF II C 2)
  
- \_\_\_\_ 3. Inspect and replace external seals and gaskets. (P-2 NATEF II C 3)
  
- \_\_\_\_ 4. Inspect extension housing, bushings, and seals and perform necessary action. (P-3 NATEF II C 4)
  
- \_\_\_\_ 5. Inspect, leak test, flush, and replace cooler, lines, and fittings. (P-1 NATEF II C 5)
  
- \_\_\_\_ 6. Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers. (P-3 NATEF II C 6)
  
- \_\_\_\_ 7. Inspect and test, adjust, repair or replace transmission related electrical and electronic components (includes computers, solenoids, sensors, relays, switches, and harnesses). (P-1 NATEF II C 7)
  
- \_\_\_\_ 8. Inspect, replace, or align power train mounts. (P-3 NATEF II C 8)

#### Assessment Activities

- \_\_\_\_ 1. Participate in discussion of subject matter. Listen, take notes and discuss lesson material
- \_\_\_\_ 2. Complete assignment and job sheets in lesson. AS1-L1-UV, AS2-L1-UV, AS1-L2-UV, AS2-L2-UV, AS3-L2-UV, AS4-L2-UV, AS5-L2-UV & JS1-L1-UV, JS2-L1-UV, JS3-L1-UV, JS4-L1-UV, JS5-L1-UV, JS6-L1-UV, JS1-L2-UV, JS2-L2-UV, JS3-L2-UV, JS4-L2-UV
- \_\_\_\_ 3. Complete written test covering in-vehicle repairs.

## Learning Plan

### Off-Vehicle Transmission and Transaxle Repair

#### Overview

To perform off-vehicle transmission and transaxle vehicle repairs.

#### 6. Perform off-vehicle transmission or transaxle component overhaul and repairs. (NATEF II D)

#### Learning Activities

- \_\_\_\_ 1. Disassemble, clean, and inspect transmission/transaxle. (P-1 NATEF II D1-3)
  
- \_\_\_\_ 2. Inspect, measure, clean, and replace valve body (includes surfaces and bores, springs, valves, sleeves, retainers, brackets, check-balls, screens, spacers, and gaskets), and torque valve body bolts. (P-2 NATEF II D1-4)
  
- \_\_\_\_ 3. Inspect servo bore, piston, seals, pin, spring, and retainers. (P-3 NATEF II D1-5)
  
- \_\_\_\_ 4. Inspect accumulator bore, piston, seals, spring, and retainer. (P-3 NATEF II D1-6)
  
- \_\_\_\_ 5. Assemble transmission/transaxle. (P-1 NATEF II D1-7)
  
- \_\_\_\_ 6. Inspect converter flex plate, attaching parts, and pilot, pump drive, and seal areas. (P-2 NATEF II D2-1)
  
- \_\_\_\_ 7. Measure torque converter endplay and check for interference and check stator clutch. (P-2 NATEF II D2-2)
  
- \_\_\_\_ 8. Inspect, measure, and replace oil pump assembly and components. (P-3 NATEF II D2-3)
  
- \_\_\_\_ 9. Check torque converter and transmission cooling system for contamination. (P-1 NATEF II D2-4)

- \_\_\_\_ 10. Measure endplay or preload and determine necessary action. (P-1 NATEF II D3-1)
- \_\_\_\_ 11. Inspect, measure, and replace thrust washers and bearings. (P-2 NATEF II D3-2)
- \_\_\_\_ 12. Inspect oil delivery seal rings, ring grooves, and sealing surface areas. (P-2 NATEF II D3-3)
- \_\_\_\_ 13. Inspect bushings and replace as necessary. (P-2 NATEF II D3-4)
- \_\_\_\_ 14. Inspect and measure planetary gear assembly (includes sun, ring gear, thrust washers, planetary gears, and carrier assembly) and replace as necessary. (P-2 NATEF II D3-5)
- \_\_\_\_ 15. Inspect case bores, passages, bushings, vents, and mating surfaces. (P-2 NATEF II D3-6)
- \_\_\_\_ 16. Inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings. (P-2 NATEF II D3-7)
- \_\_\_\_ 17. Inspect measure, repair, adjust, or replace transaxle final drive components. (P-2 NATEF II D3-8)
- \_\_\_\_ 18. Inspect and reinstall parking pawl, shaft, spring, and retainer. (P-3 NATEF II D3-9)
- \_\_\_\_ 19. Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates and replace as needed. (P-2 NATEF II D4-1)
- \_\_\_\_ 20. Measure clutch pack clearance and adjust as needed. (P-1 NATEF II D4-2)
- \_\_\_\_ 21. Air test operation of clutch and servo assemblies. (P-1 NATEF II D4-3)
- \_\_\_\_ 22. Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers and replace as needed. (P-2 NATEF II D4-4)

\_\_\_\_23. Inspect bands and drums and adjust or replace as needed. (P-3 NATEF II D4-5)

**Assessment Activities**

\_\_\_\_1. Participate in discussion of subject matter. Watch A/V presentation, complete Ford CBI activity, take notes, listen, and discuss material presented.

\_\_\_\_2. Complete assignment and job sheets in lesson. AS1-L1-UVI, AS2-L1-UVI, AS3-L1-UVI, AS4-L1-UVI, AS5-L1-UVI, AS6-L1-UVI, AS7-L1-UVI, AS8-L1-UVI, AS1-L2-UVI, AS2-L2-UVI, AS3-L2-UVI, AS4-L2-UVI, AS5-L2-UVI & JS1-L1-UVI, JS2-L1-UVI, JS3-L1-UVI, JS4-L1-UVI, JS5-L1-UVI, JS6-L1-UVI, JS7-L1-UVI, JS8-L1-UVI, JS9-L1-UVI, JS10-L1-UVI, JS1-L2-UVI, JS2-L2-UVI, JS3-L2-UVI JS4-L2-UVI, JS5-L2-UVI

\_\_\_\_3. Complete written test covering transmission/transaxle overhaul.