

**Course Outline for AUTO A2**  
**AUTOMATIC TRANSMISSION/TRANSAXLE**

**Effective: Fall 2016**

**I. CATALOG DESCRIPTION:**

AUTO A2 — AUTOMATIC TRANSMISSION/TRANSAXLE — 4.00 units

An in depth study of engine, transmission, transaxles: mechanical, measurement, and assembly. An in-depth study of the above mentioned components including theory, teardown, evaluate, qualifying, and rebuilding. Students are encouraged to enroll in Automotive Lab concurrently.

2.00 Units Lecture 2.00 Units Lab

**Prerequisite**

AUTO INTR - Automotive Service and Introduction  
 with a minimum grade of C  
 (May be taken concurrently)

**Grading Methods:**

Letter or P/NP

**Discipline:**

	<u>MIN</u>
<b>Lecture Hours:</b>	36.00
<b>Lab Hours:</b>	108.00
<b>Total Hours:</b>	144.00

**II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1**

**III. PREREQUISITE AND/OR ADVISORY SKILLS:**

**Before entering the course a student should be able to:**

**A. AUTOINTR**

1. identify and describe uses of automotive related tools;
2. perform basic engine teardown and reassembly;
3. apply Ohm's law, read basic schematics, test automotive electrical systems;
4. identify different transmissions, understand theory of operation of both manual and automatic transmissions and fluid requirements;

**IV. MEASURABLE OBJECTIVES:**

**Upon completion of this course, the student should be able to:**

- A. Demonstrate the basic safety procedures of handling hazardous waste materials.
- B. Explain the history of powertrain evolution.
- C. Operate a wide variety of precision measurement equipment.
- D. Explain transmission gear ratio and hydraulic theory.
- E. Teardown typical transmission assembly.
- F. Take measurements of transmission components and compare to specifications.
- G. Qualify new and used transmission components
- H. Rebuild transmission to manufacturer specifications.
  - I. Maintain a clean and professional environment.
  - J. Demonstrate Ohm's law
  - K. Test transmission valve bodies and diagnose issues

**V. CONTENT:**

- A. Safety
  1. Tool usage and nomenclature
  2. Proper disposal procedures
  3. Environmentally conscious decisions
- B. Powertrain evolution
  1. Horsepower and emission trade offs
  2. Environmental decisions driving design
  3. The first automatic transmissions
  4. Current automatic transmissions

- a. More gear ratios
  - b. Different fluids
  - c. Internal design improvements
- C. Measurement tools
  - 1. Micrometer
    - a. Vernier
    - b. Caliper
  - 2. Dial bore gauge
  - 3. Snap gauges
  - 4. Straight edge
  - 5. Feeler gauges
  - 6. Hole gauges
- D. Automatic Transmission Theory
  - 1. Gear Ratios
    - a. Shift Points
    - b. Planetary gear sets
    - c. Valves
    - d. Clutches
    - e. Sprags
  - 2. Hydraulics
    - a. Basic and advanced hydraulics
    - b. Hydraulic control components
    - c. Fluid pressures
      - 1. Line
      - 2. Apply
      - 3. Release
      - 4. Clutch
      - 5. Accumulator
      - 6. Torque
      - 7. Servo
      - 8. D4, D3, D2, D1
  - 3. Other Components
    - a. Final Drives
    - b. Torque converters
    - c. Apply systems
    - d. Differential components
    - e. Electrical components
      - 1. TCM, THECM, PCM
      - 2. Fluid temperature sensor
      - 3. TISS and TOSS
      - 4. TCC
      - 5. PRNDL
- E. Transmission Teardown
  - 1. Removal and identification of FWD
    - a. Special procedures
  - 2. Removal and identification of RWD
    - a. Special procedures
- F. Component measurement
  - 1. Specification lookup
  - 2. Comparison
    - a. Component diagnosis
      - 1. Failure analysis
- G. . Qualification of replacement components
  - 1. Correct component?
  - 2. New and used part comparison
- H. Transmission rebuilding
  - 1. Manufacturer Procedures
    - a. Component sequence
    - b. Torque specifications
    - c. Tightening sequences
    - d. Special concerns
  - 2. Assembly lube
  - 3. Gaskets and sealers
- I. Ohm's law
- J. Valve body diagnosis
- K. Professionalism
  - 1. Safety glasses
  - 2. Working shop expectations
  - 3. Attitude
  - 4. Cleanliness
  - 5. Maintenance of work areas and tools

## VI. METHODS OF INSTRUCTION:

- A. **Lab** - Group and individual laboratory activities
- B. **Lecture** -

## VII. TYPICAL ASSIGNMENTS:

- A. Lecture based assignments
  - 1. Lecture on Automatic transmission clutch packs
- B. Lab based assignments
  - 1. Remove and measure clutch pack travel, reassemble.
- C. Text reading assignments
  - 1. Read Chapter One.

## VIII. EVALUATION:

- A. **Methods**
  - 1. Exams/Tests
  - 2. Quizzes

3. Lab Activities

**B. Frequency**

1. Minimum two tests
  - a. Midterm
  - b. Final
2. Weekly quizzes
3. Biweekly lab assignments
4. Weekly homework assignments from text

**IX. TYPICAL TEXTS:**

1. Rehkopf, Jeffery. *Automotive Engine Repair and Rebuilding.*, Prentice Hall, 2014.
2. Birch, Tom. *Automatic Transmissions and Transaxles.*, Prentice Hall, 2014.
3. Halderman, James. *Automotive Maintenance and Light Repair.* 6 ed., Pearson, 2014.

**X. OTHER MATERIALS REQUIRED OF STUDENTS:**

- A. Safety glasses