



### AST 210 Manual Transmission and Driveline repair

#### Course Information

Division	ASET
Contact Hours	120
Theory	30
Lab Hours	90
Total Credits	5

Prerequisites – AST 101, AST 105

#### Course Description

This course focuses on the operation, maintenance and service procedures of manual drive trains and axles including drivelines, constant velocity (CV) joints, manual transmissions and transaxles, differentials and clutches.

This course will be an elective course taken by students who chose to take this as their elective in the AAS in Automotive Service Technology program

#### Program Outcomes Addressed by this Course:

Upon successful completion of this course, students should be able to meet the program outcomes listed below:

- A. Demonstrate the correct method of utilizing automotive service tools and equipment
- B. Identify all related system diagnostic/repair information within automotive service information
- C. Employ safe and professional work habits while conducting typical automotive service procedures.
- D. Explain how the various systems of an automobile work
- E. Demonstrate correct service procedures in the various automotive systems
- F. Test and diagnose the proper operation of the various automotive systems

#### Course Outcomes

In order to evidence success in this course, the students will be able to:

#### 1. Understand and demonstrate general drive train operation, diagnosis and service.

This outcome is relevant to program outcomes: (A) , (B),(C),(D), (E) and (F)

- a) Identify and interpret drive train concerns; determine necessary action.
- b) Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins.
- c) Check fluid condition; check for leaks; determine necessary action.
- d) Drain and refill manual transmission/transaxle and final drive unit.

#### 2. Understand and demonstrate clutch operation, diagnosis, and repair

This outcome is relevant to program outcomes: (A) , (B),(C),(D), (E) and (F)

- a) Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action.
- b) Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action.



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- c) Inspect and replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing and linkage, and pilot bearing/bushing (as applicable).
- d) Bleed clutch hydraulic system.
- e) Check and adjust clutch master cylinder fluid level; check for leaks.
- f) Inspect flywheel and ring gear for wear and cracks; determine necessary action.
- g) Measure flywheel runout and crankshaft end play; determine necessary action.

### **3. Understand and demonstrate transmission/transaxle operation, diagnosis, and repair**

This outcome is relevant to program outcomes: (A) , (B),(C),(D), (E) and (F)

- a) Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers.
- b) Describe the operational characteristics of an electronically-controlled manual transmission/transaxle.
- c) Diagnose noise concerns through the application of transmission/transaxle power flow principles.
- d) Diagnose hard shifting and jumping out of gear concerns; determine necessary action.
- e) Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action.
- f) Disassemble, inspect clean, and reassemble internal transmission/transaxle components.
- g) Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action.
- h) Diagnose universal joint noise and vibration concerns; perform necessary action.
- i) Inspect, remove, and replace front wheel drive (FWD) bearings, hubs, and seals.
- j) Inspect, service, and replace shafts, yokes, boots, and universal/CV joints.
- k) Check shaft balance and phasing; measure shaft runout; measure and adjust driveline angles.

### **4. Understand and demonstrate ring and pinion, gear and differential case assembly operation, diagnosis and repair.**

This outcome is relevant to program outcomes: (A) , (B),(C),(D), (E) and (F)

- a) Clean and inspect differential housing; check for leaks; inspect housing vent.
- b) Check and adjust differential housing fluid level.
- c) Drain and refill differential housing.
- d) Diagnose noise and vibration concerns; determine necessary action.
- e) Inspect and replace companion flange and pinion seal; measure companion flange runout.
- f) Inspect ring gear and measure runout; determine necessary action.



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- g) Remove, inspect, and reinstall drive pinion and ring gear, spacers, sleeves, and bearings.
- h) Measure and adjust drive pinion depth.
- i) Measure and adjust drive pinion bearing preload.
- j) Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup or shim types).
- k) Check ring and pinion tooth contact patterns; perform necessary action.
- l) Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case.
- m) Reassemble and reinstall differential case assembly; measure runout; determine necessary action.

#### **5. Understand and demonstrate limited slip differential operation, diagnosis and repair.**

This outcome is relevant to program outcomes: (A) , (B),(C),(D), (E) and (F)

- a) Diagnose noise, slippage, and chatter concerns; determine necessary action.
- b) Measure rotating torque; determine necessary action.

#### **6. Understand and demonstrate drive axle operation diagnosis and repair.**

This outcome is relevant to program outcomes: (A) , (B),(C),(D), (E) and (F)

- a) Inspect and replace drive axle wheel studs.
- b) Remove and replace drive axle shafts.
- c) Inspect and replace drive axle shaft seals, bearings, and retainers.
- d) Measure drive axle flange runout and shaft end play; determine necessary action.
- e) Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action.

#### **7. Understand and demonstrate four-wheel drive/all-wheel drive component operation, diagnosis, and repair.**

This outcome is relevant to program outcomes: (A) , (B),(C),(D), (E) and (F)

- a) Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.
- b) Inspect front-wheel bearings and locking hubs; perform necessary action(s).
- c) Check for leaks at drive assembly seals; check vents; check lube level.
- d) Identify concerns related to variations in tire circumference and/or final drive ratios.
- e) Diagnose noise, vibration, and unusual steering concerns; determine necessary action.
- f) Diagnose, test, adjust, and replace electrical/electronic components of four-wheel drive systems.
- g) Disassemble, service, and reassemble transfer case and components.



MONROE COUNTY  
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# Course Outcome Summary

Required Program Core Course

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