

## CUYAMACA COLLEGE OFFICIAL COURSE OUTLINE

### **AUTOMOTIVE TECHNOLOGY 152 – DRIVE TRAIN SYSTEMS**

2.5 hours lecture, 4.5 hours laboratory, 4 units

#### **Catalog Description**

In-depth study of hydraulic power transmission and control systems used in automatic transmissions including diagnosis and overhaul of actual transmissions to precise industry standards. Plus, theory of operation, diagnosis, repair and overhaul of manual transmissions, clutches, drivelines and differentials including four wheel drive and front wheel drive. Students will be required to complete associated tasks in the shop as specified by NATEF (National Automotive Training Educational Foundation). Preparation for ASE A-2 and A-3 Certification.

#### **Prerequisite**

None

#### **Course Objectives**

Students will be able to:

- 1) Acquire safe working habits
- 2) Relate driveline theory to practical application
- 3) Perform manual transmission, clutch and driveline repair to prescribed industry standards
- 4) Perform automatic transmission diagnosis and repair to prescribed industry standards

#### **Special Materials Required of Student**

- 1) Basic hand tool set
- 2) Approved safety glasses
- 3) Notebook, required textbook

#### **Minimum Instructional Facilities**

- 1) Auto tech lab (6 bays)
- 2) Complete auto drive train equipment center
- 3) Automotive transparencies, PowerPoint presentations, CD/DVD videos
- 4) VCR/monitor
- 5) SMART classroom

#### **Course Content**

- 1) Lecture:
  - a. Introduction and safety
  - b. Purpose of clutch
  - c. Types of clutches
  - d. Pressure plate design
  - e. Standard transmission principles
  - f. Gear types
  - g. Synchronizer types
  - h. Gear ratios
  - i. Types of linkages
  - j. Electrical clutches
  - k. Driveline clutches
  - l. Front drive units
  - m. Overdrive units
  - n. Four wheel drive units
  - o. Hydraulics theory and fluid flow in typical transmissions
  - p. Torque converter operation including lock-up type
  - q. Operation of: drums, bands, servos, accumulators, clutches, modulators, governors
  - r. Planetary gear operation and control

- s. Shift control and valve bodies
  - t. Electronic shift control
  - u. Coolers and fluid types
  - v. Diagnosing automatic transmission problems
- 2) Lab:
- a. Introduction and safety
  - b. Laboratory procedures
  - c. Equipment operation
  - d. Transmission removal
  - e. Transmission cleaning and disassembly
  - f. Part inspection and failure diagnosis
  - g. Valve body service
  - h. Diagnosis, service and repair of electronic shift control systems and components
  - i. Lock-up converter diagnosis and repair
  - j. Transmission reassembly and installation
  - k. Clutch diagnosis and repair
  - l. Overdrive repairs and shift linkage adjustment
  - m. Driveline service (both front and rear drive cars)
  - n. Oil seal replacement
  - o. Wheel bearing diagnosis and replacement
  - p. Ring and pinion gear replacement
  - q. Differential repair (standard and Posi-Trac types)

#### **Method of Instruction**

- 1) Lecture and demonstration
- 2) Individual assistance

#### **Method of Evaluation**

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.

- 1) Quizzes and written exams
- 2) Observation of student work
- 3) Inspection of work completed
- 4) Hands-on performance exam

#### **Texts and References**

- 1) Required: Thiessen/Dales. Automotive Drive Trains Automatic and Manual. 2<sup>nd</sup> edition. Prentice Hall, 1996.
- 2) Supplemental: None

#### **Exit Skills**

Students having successfully completed this course exit with the following skills, competencies and/or knowledge:

- 1) Understand operational theory and diagnosis of automatic and manual transmissions
- 2) Understand operational theory and diagnosis of transfer cases and differentials
- 3) Ability to perform pressure tests on automatic transmission
- 4) Ability to diagnose and repair electronic shift components
- 5) Ability to remove and re-install automatic and manual transmissions and transaxles
- 6) Ability to inspect and adjust linkages, cables and range selectors
- 7) Ability to diagnose and inspect drive-train components for oil leaks
- 8) Ability to diagnose, adjust and replace clutch components
- 9) Ability to diagnose and repair differential and drive axle components
- 10) Ability to diagnose and repair four wheel drive and transaxle components