

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

Automotive Technology 131L – Manual Transmission and Transaxle Repair Laboratory

3 hours laboratory, 1 unit

Catalog Description

This laboratory course describes and demonstrates proper operation, disassembly, assembly, repair, and diagnostic techniques for various manual transmission types and designs including electronic shift. The course also includes relationship of torque and coupling using EV electric vehicle motors and traditional clutches. This course is the lab for students taking AUTO 131 Manual Transmission and Transaxle lecture, and or for students taking work experience and need additional instruction and practice completing required ASE competencies and tasks.

Prerequisite

None

Recommended Preparation

“C” grade or higher or “Pass” in Automotive Technology 162T – Electronics Diagnosis and Repair Assessment Test out

Entrance Skills

Without the following skills, competencies, and knowledge, students entering this course will be highly unlikely to succeed:

- 1) Describe and test computer inputs
- 2) Describe and test actuator outputs
- 3) Describe normal and abnormal sensor waveforms
- 4) Demonstrate thermistors
- 5) Test potentiometers
- 6) Test variable resistors
- 7) Test various Hall Effect sensors
- 8) Pressure sensors
- 9) Test Mass Air Flow
- 10) Heater elements
- 11) Capture waveforms using a lab scope
- 12) Describe computer communication
- 13) Use scan tool to compare PID values to test values of sensors
- 14) Create scan tool maps
- 15) Scan tool component and systems test and activations
- 16) Describe types and functions of computer memory
- 17) Clear codes, clear adaptive memory
- 18) Describe network communication data

Course Content

- 1) Safety policies and procedures
- 2) Laboratory exercises using distance education technologies
- 3) Laboratory practice using virtual reality or mobile technologies

- 4) Assistance of repair techniques using web conferencing and remote access computer sharing
- 5) Clutch friction theory
- 6) Flywheel theory and operation
- 7) Shift levers and forks
- 8) Synchronizers
- 9) Hydraulic cylinders and repair methods
- 10) Gear assembly
- 11) Gear reduction and overdrive
- 12) Output shaft and input shafts
- 13) Gear selection motor
- 14) Motors Electric Vehicle
- 15) Planetary gears
- 16) Linkage
- 17) Lock out switches
- 18) Fluids
- 19) Release bearing and mechanisms
- 20) Pilot bearing
- 21) Transmission bearings
- 22) Measurements
- 23) Component Identification
- 24) HV high voltage battery
- 25) Seals and sealants
- 26) Manual transmission computer data

Course Objectives

Students will be able to:

- 1) Demonstrate assembly and concerns of various types of gears and correct their operation
- 2) Show gear ratios and power flow using an actual gear set
- 3) Define terms: power, torque, reduction, overdrive, multiplication of torque
- 4) Disassemble and reassemble various types of bearings and components.
- 5) Inspect various fluid types and demonstrate the methods of checking fluids.
- 6) Demonstrate knowledge of clutch operation and symptoms of customer concerns and perform the clutch tests necessary to diagnose the problem.
- 7) Correct gearshift problems necessary for manual transmissions
- 8) Demonstrate electrical and electronic shift principles for automated manual transmissions
- 9) Demonstrate the tests of the hydraulic systems
- 10) Use the workshop manual and scan tool to perform a transmission calibration and adaptation.

Method of Evaluation

A grading system will be established. Grades determined by summative test proficiency in the subject matter using multiple measurements, one of which is a demonstration of the components related to the cause of failure using the diagnostic processes and skills demonstrations of corrections.

- 1) Skills-based summative assessment that measures students' ability to complete the required ASE tasks related foundational knowledge of diagnosis, replacement, repair, and testing of automotive manual transmission systems.
- 2) Practical exercises that measure students' progress toward mastering tasks related to identification, description, communication, memorization of components for testing of manual transmissions.
- 3) A Student portfolio is required to showcase student comprehension.
- 4) Web based training modules.

- 5) Performance projects used to evaluate student ability to accurately perform repair procedures using web conferencing and simulations.

Special Materials Required of Student

- 1) Approved safety glasses.
- 2) High-speed internet connection and access to large screen computer, laptop, or tablet.
- 3) Students will have access to testing tools and equipment while on campus and by simulations.
- 4) Uniform dress code is required.

Minimum Instructional Facilities

- 1) Auto tech lab (20 service bays)
- 2) Various training vehicles
- 3) Smart classroom
- 4) Diagnostic tools and equipment

Method of Instruction

- 1) Demonstration
- 2) Individual assistance
- 3) Feedback of repair processes regardless of successful or unsuccessful

Out-of-Class Assignments

- 1) **Reading:** assigned course materials, manuals, content on websites, and more.
- 2) **Writing:** assignments where students describe the required tasks related to diagnosis, replacement, repair, and testing of manual transmission systems and transaxles, and more
- 3) **Other:** web-based training modules, portfolio performance projects related to manual transmission systems and transaxles, and more.

Texts and References

- 1) Required (representative examples):
 - a. Student workbooks – will be provided electronically.
 - b. Required: VanGelder, Kirk. Fundamentals of Automotive Technology. Jones and Bartlett Learning, 2023.
 - c. Web Based Training Modules will be provided electronically.
 - d. Workshop Manuals will be provided electronically.
- 2) Supplemental: None

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

- 1) Accurately demonstrate knowledge of various manual transmission system conditions.
- 2) Correct manual transmission system problems by performing necessary actions.
- 3) Communicate effectively and professionally in a diverse setting that includes prospective colleagues, clients, and supervisors.
- 4) Comply with environmental health and safety regulations at the state and federal levels.