

Lassen Community College Course Outline

AT-66 Manual Drive Train

4.0 Units

I. Catalog Description

This course is designed to provide the student with theory and practical experience in operation, repair and adjustment of common manual transmissions, drive lines, differentials, transfer cases and 2- and 4-wheel drive systems. Clutches, wheel bearings and axle repair will also be studied. This course meets ASE Education Foundation standards for steering and suspension. This course has been approved for Hybrid Delivery.

Recommended Preparation: Successful completion of ENGL105 or equivalent multiple measures placement.

34 Hours Lecture, 102 Hours Lab, 68 hours outside-of-class, 204 total student learning hours
Scheduled: Fall odd

II. Coding Information

Repeatability: Not Repeatable. Take 1 Time
Grading Option: Graded or Pass/No Pass
Credit Type: Credit - Degree Applicable
TOP Code: 094800

III. Course Objectives

A. Course Student Learning Outcomes

Upon completion of this course the student will be able to:
Diagnose, analyze, and repair common problems found in manual transmissions, drive shafts, clutches, differentials, drive axles, and 4wheel drive systems at a beginner level.

IV. Course Content

A. Shop safety and shop routine

1. Shop safety and routines
2. Vehicle identifying information, customer concern, related service history, cause, and correction.
3. Identify and interpret manual drivetrain system concern; determine necessary action.

B. General drive train diagnosis

1. Locate and interpret vehicle and component identification numbers
2. Identify and interpret drive train concern and determine necessary action
3. Research applicable vehicle and service information
4. Diagnose fluid loss, level, and condition concerns

C. Manual transmissions

1. Theory of operation
2. Gear ratios- under drive, direct drive, and over drive
3. Diagnose noise concerns using transmission power flow principles
4. Diagnose hard shifting and jumping out of gear concerns
5. Removal and replacement techniques
6. Disassembly, inspection, and cleaning
7. Inspect case, tail shaft housing, bores, bushings and vents

8. Inspect and adjust shift linkages, brackets, and levers
 9. Measure end-play, or preload on transmission shafts
 10. Inspect synchronizer assembly, gears, shafts, hubs, and bearings
 11. Reassembly
- D. Clutches.**
1. Theory of operation
 2. Clutch application system- mechanical; hydraulic; cable
 3. Symptom diagnosis
 4. Service and replacement
 5. Flywheel inspection
 6. Adjustment
- E. Drive shafts**
1. Theory of operation
 2. Universal joint inspection and replacement
 3. Slip yoke design and inspection
 4. Constant velocity joints
 5. Balancing
- F. Differentials**
1. Theory of operation
 2. Types-open; limited slip; and locker
 3. Disassembly and inspection
 4. Inspect ring gear and measure runout.
 5. Reassembly and set up
- G. 4 wheel drive systems**
1. Theory of operation
 2. Hub and axle
 3. Transfer case theory
 4. Transfer case disassembly and inspection
 5. Transfer case reassembly
 6. Removal and replacement techniques
- H. Wheel and axle bearings**
1. Theory and construction
 2. Front wheel bearing service
 3. Cleaning and inspection
 4. Grease packing and adjustment
 5. Rear wheel bearing inspection and replacement

V. Assignments

A. Appropriate Readings

1. Industry materials as furnished by the instructor
2. Manufacturers bulletins
3. Current professional manuals

B. Writing Assignments

Typical writing assignments will include:

1. Providing written answers to assigned questions
2. Performing mathematical calculations as assigned
3. Maintaining a notebook of class assignments/activities
4. Maintain a record of completed assignments/activities

C. Expected Outside Assignments

Appropriate outside assignments may include:

1. Researching appropriate readings
2. Preparing written assignments
3. Studying as needed for successful classroom performance

D. Specific Assignments that Demonstrate Critical Thinking

Students will perform analysis and evaluation of readings and/or classroom materials and utilize this analysis in classroom discussion, writing assignments, and in performing laboratory activities. Students must select and use appropriate methods and materials needed to complete laboratory assignments.

VI. Methods of Evaluation

Term paper (topic choice, thesis statement, outline, bibliography, rough draft, final draft), homework, classroom discussion, essay, journals, lab demonstrations and activities, multiple choice quizzes, and participation.

Hybrid Evaluation

All quizzes and exams will be administered during the in person class time. Students will be expected to complete online assignments and activities equivalent to in class assignments and activities for the online portion of the course. Electronic communication, both synchronous and asynchronous (chat/forum) will be evaluated for participation and to maintain effective communication between instructor and students.

VII. Methods of Delivery

Check those delivery methods for which, this course has been separately approved by the Curriculum/Academic Standards Committee.

Traditional Classroom Delivery Correspondence Delivery

Hybrid Delivery Online Delivery

Traditional Classroom Delivery:

The appropriate method of instruction will be determined by the instructor and may include:

1. Lecture with or without various audio/visual aids.
2. Group problem solving, discussion, debate, and/or critique.
3. Demonstration
4. Computer-assisted/other self-paced instruction.
5. Field trips or field assignments.
6. Laboratory assignments utilizing planned activities or 'live' work.

Hybrid Delivery:

Hybrid modality may involve face to face instruction mixed with online instruction. A minimum of 1/3 of instruction, including 100% labs, will be provided face to face. The remaining hours will be taught online through a technology platform as adopted by the district.

VIII. Representative Texts and Supplies

VanGelder; *Master Automotive Technician Series Automotive Drivetrain and Manual Transmissions*, 2018, 1st Edition, Jones and Bartlett Learning, ISBN 9781284145267
Current professional manuals

Industry materials as furnished by the instructor.
Appropriate shop clothing, proper footwear, and safety glasses.

IX. Discipline/s Assignment

Automotive Technology

X. Course Status

Current Status: Active

Original Approval Date: 02/05/2013

Revised By: Chad Lewis

Board Approved: 03/12/2013

Chancellors' Approval: 05/01/2013

Curriculum/Academic Standards Committee Revision Date: 02/15/2022