

AUT 141 (A4)
SUSPENSION AND STEERING

COURSE DESCRIPTION:

Prerequisites: None

Corequisites: None

This course covers principles of operation, types, and diagnosis/repair of suspension and steering systems to include steering geometry. Topics include manual and power steering systems and standard and electronically controlled suspension and steering systems. Upon completion, students should be able to identify steering and suspension problems, service and repair steering and suspension components, ~~ch~~ and adjust alignment angles, and repair and balance tires.
Course Hours per Week: Class, 2; Lab Hours, 3; Semester Hours Credits, 3.

SAFETY DISCLAIMER:

Automotive work presents many hazards. A moment's carelessness can cause injury to oneself or

LEARNING OUTCOMES:

Upon completion of this course the student will be able to:

- a. Identify vehicle information and observe steering safety procedures.
- b. Inspect, diagnose, and repair tire problems and perform tire maintenance.
- c. Inspect, diagnose and replace front suspension components.
- d. Diagnose suspension noise, vibration and harshness.
- e. Inspect, diagnose and replace rear suspension components.
- f. Diagnose and inspect steering wheel and ste

- 6) Lateral Force Variation
- 7) Axle Flange/Rotor Hub Runout
- H. Tire Repair
- I.

- 5) Tie rod ends/sleeves/clamps
- 6) Relay rod (center link)
- 7) Pitman arm and sector shaft
- 8) King pins/bushings/knuckle
- 9) Twin I-beam axle bushings and radius arms
- 10) Shock absorber.7a a) Conventional b) Air
 - c) Strut cartridge installation
 - d) Computer actuated motor.7a 11) Rebound bumper.7a 12) Torsion bar.7a 13) Steering knuckle
 - 14) Sway bar and linkage
 - 15) Strut rod bushings 16) Wheel bearings/adjustments
 - 17) Steering damper
- 18) Rack mounting bushings and brackets
- 19) Spring insulator.7a B. Determine Needed Repairs
 - C. Replace Components (Procedures)
 - 1) Tool identification
 - a) Spring compressors/clips
 - b) Ball joint press

V. Rear Suspension Systems

A. Function of Components

- 1) "U" Bolts
- 2) Control arms
- 3) Stabilizer bar
- 4) Controlling "wrapup"
- 5) Shackles, brackets and mounts
- 6) Springs
- 7) Transverse link.7a B. Rear Wheel Steering
 - 1) Cars
 - 2) Trucks

C. Replace Components (Procedures)

VI. Steering

A. Manual

- 1) Types
- 2) Adjustments
- 3) Diagnosis
 - a) Hard steering
 - b) Looseness
 - c) Roughness
 - d) Binding through the center of travel
 - e) Column noise

B. Power

- 1) Types (including variable assist)
- 2) Inspect and. check system/adjustment tools
- 3) Replace components (procedures)
- 4) Bleeding
- 5) Inspect and replace steering shaft joint(s)
- 6) Inspect and replace flexible coupling ("rag"joint)
- 7) Diagnosis
 - a) Hard steering (reduced assist)
 - b) Loss of fluid (leakage points)
 - c) Checking procedures
 - d) Noises (including tilt and tel

- 6) Hose replacement procedures
- 7) System flushing/filter installation
- 8) Short rack replacement

VII. Emerging Suspension and Steering Technologies

VIII. Alignment Factors

- A. Caster
- B. Camber
- C. Toe
- D. Steering Axis Inclination (SA I.)
- E. Toe-Out on Turns (Turning Radius)
- F. Included Angle
- G. Steering Wheel Centering
- H. Point of Intersection
- I. Riding Height/Frame Angle
- J. Thrust Angle
- K. Setback
- L. Scrub Radius
- M. Torsion Bar Adjustment

IX. Alignment Angle Effects

- A. Caster
 - 1) Positive or negative
 - 2) A directional control angle
 - 3) Wander and weave
 - 4) Stability
 - 5) Turning effort
 - 6) Returnability
 - 7) Road crown pull
 - 8) Can cause outside shoulder "chew" if excessive
- B. Camber
 - 1) Positive or negative
 - 2) Is a tire wearing angle
 - 3) Pulling
 - 4) Provides for easyffing angle

1)

- E. "Included" Angle
 - 1) Can help determine a bent spindle or strut
- F. Toe-Out on Turns
 - 1) Built-in design angle (steering arms)
 - 2) Purpose
 - 3) Greater angle on inside wheel
 - 4) Oversteer and understeer
 - 5) Tire wear (scuffing)
- G. Determine Needed Repairs
- H. Front Alignment (Including Prealignment Inspection)
 - 1) Sequence procedure for alignment (2 wheel, 4 wheel, and electronic systems)
 - 2) Method of adjustment for caster and camber
 - a) Shims (understand adjustment location)
 - b) Eccentrics
 - c) Serrated/slotted cross shaft
 - d) Strut rods
 - e) Cold bending
 - 3) Toe
 - a) Scribing the tire
 - b) Adjusting sleeve tool
 - c) Left-hand and right-hand threads
 - d) Centering steering wheel
 - e) Shims
 - 4) MacPherson strut adjustment(s)
 - 5) Toe-out on turns (turning radius)
 - a)

