Butler Community College
Business, Technology, and Workforce Development Division
Mike Fatkin
Fall 2004

COURSE OUTLINE

Suspension and Steering I

Course Description

AT 203 Suspension and Steering I. 3 Credit Hours, Prerequisite: AT 106. This course will enable the student to diagnose and repair steering systems. The study will examine steering component operation, diagnosis and repair procedures. Steering complaints due to tires, linkages, columns, manual and power steering systems, couplings and mounts will be examined.

Course Relevance

The principles and techniques acquired in this course are common to the automotive industry and are the foundation for all steering systems. Comprehension of these principles allows the student to effectively diagnose and repair common automotive steering and suspension systems.

Required Materials

Halderman James D. (1995). *Automotive Steering, Suspension and Alignment*. New York: Prentice Hall Publishers.

Learning Outcomes

The intention is for the student to be able to:

1. Diagnose and safely repair steering systems that are in current use within the industry
2. Comply with all manufacturers recommended procedures during the repair process.
3. Comprehend the need for safe, responsible repair practices when dealing with steering related complaints.
4. Research and follow service bulletins related to steering repair.

Learning PACT

Through the student involvement in this course, the student will develop and document his/her achievement of the following PACT skills:

Primary skills (developed and documented):

1. Problem solving
    - Through the application of the principles and techniques acquired in this course, the student will analyze steering system problems and choose the proper repair procedure.
2. Critical Thinking
    - Through the solution of steering problems, the student will develop critical thinking skills. The student will employ ìoutside ñinî thinking processes to examine the system as an interrelated entity functioning as a whole based

upon the strength of its individual components.

3. Communication
   - Through working as a team in the lab environment, the student will develop interpersonal communication skills The student will recognize the need for clear, concise communication between the technician and the consumer to effectively analyze and repair the complaint..
4. Field related Technology
   - Through the selection and use of tools appropriate for the assigned task, the student will develop the ability to research specifications and service bulletins related to the repair procedure.

Secondary skills (developed but not documented):

Listening
Reading/Research
Time management
Ethical work practices
Responsibility

Assessment Tasks

These learning outcomes and primary Learning PACT skills will be demonstrated by:

1. In a field related environment, listing, describing, and explaining the operation of the basic components for an automotive steering system.
2. Demonstrate the ability to diagnose complaints due to looseness in flex joints, couplers and steering columns.
3. Demonstrating the ability to flush, fill and bleed power steering units.
4. Demonstrating an understanding of tire mounting and balancing.

Course Content

I. **Themes** - Key recurring concepts that run throughout this course:
   - A. Ethical work practices
   - B. Cost effectiveness
   - C. Safety in the work place
   - D. Time management
   - E. Communication

II. **Issues** - Key issues that will be addressed in this course: areas of conflict that must be understood in order to achieve the intended outcome:
   - A. Effective relationships within a team environment
   - B. Responsibility
   - C. Dealing with diversity within the Lab/Classroom
   - D. Dealing with situations that limit individual performance
   - E. Coping with technological change

III. **Concepts** - Key concepts that must be understood to address the issues:
   - A. Hydraulic principles
   - B. Mechanical principles
   - C. Basic Laws of Physics

D. Mathematics

IV. **Skills / Competencies** - Actions that are essential to achieve the course outcomes:

A. Disable supplemental restraint system in accordance to manufacturerís procedures.
B. Diagnose steering column noises, looseness, and binding problems (including tilt mechanisms); determine needed repairs.
C. Diagnose power (non-rack and pinion) steering gear binding,
    i. uneven turning effort, looseness, hard steering; determine needed repairs.
D. Diagnose power rack and pinion vibration, looseness, and hard steering problems; determine needed repairs.
E. Inspect and replace steering shaft universal joints, flex couplings,
    i. collapsible columns lock cylinder and steering wheel.
F. Adjust manual or power non-rack preload and sector lash
G. Remove and replace manual and power rack and pinion steering
    i. Gear; inspect mounting bushings and brackets
H. Inspect and replace manual or power rack and pinion steering gear
I. Tie rod ends and bellows boots.
J. Inspect manual and power steering fluid levels and condition
K. Flush, fill and bleed power steering system.
L. Diagnose power steering leakage determine needed repairs
M. Inspect, replace, and adjust power steering pump belt
N. Remove, inspect, and replace power steering pump, mounts, seals
    i. And gaskets.
O. Remove, inspect and replace power steering pulley
P. Perform power steering pressure test; determine repairs.
Q. Inspect and replace power steering hoses and fittings
R. Inspect and replace pitman arm, relay rod, idler arm and mounts
S. and steering linkage dampner.
R. Inspect, replace and adjust tie rod ends, sleeves and clamps.
S. Diagnose, inspect, adjust, repair or replace components of
T. Electronically controlled steering systems.
U. Diagnose tire wear patterns; determine needed repairs.
V. Inspect tires and adjust air pressure
W. Diagnose wheel/tire vibration, shimmy, and noise; determine
X. Needed repairs
W. Rotate tires according to manufacturer’s recommendations
X. Measure wheel, tire, axle and hub run out; determine needed repairs
Y. Diagnose tire pull problem; determine needed repairs
Z. Balance wheel and tire assembly
AA. Dismount, inspect, repair and remount tire on wheel
BB. Re-install wheel torque to specifications

Learning Units

I. Demonstrate an analytical, systematic approach to steering system repairs.
II. Demonstrate knowledge of the Steering system component operation, diagnosis and repair
III. Demonstrate ethical, responsible work practices during repairs
IV. Demonstrate comprehension of power steering pump operation, diagnosis and repair
V. Demonstrate proper diagnosis and repair of tire related complaints.
VI. Demonstrate the ability to research and follow steering related service Bulletins.

Learning Activities

Independent and collaborative learning activities will be assigned within the classroom and lab environment to assist the student in achieving the desired outcomes. Class discussion, lecture, reading assignments and supportive lab activities will also contribute to the learning process.

Grade Determination

Grade determination will be based on the student ís performance of assignments and assessment tasks within the classroom/lab environment. Attendance, group participation, attitude towards fellow students and assigned tasks will be reflected in the final grade. Lab tasks (competencies) will be evaluated (rated) on the competency profile.