COURSE OUTLINE

AUTO 282 – SUSPENSION DESIGN AND SERVICE LABORATORY

Prepared By: Issac R. Thomas

Revised By: Kenneth Wurster
A. **TITLE:** Suspension Design and Service

B. **COURSE NUMBER:** AUTO 282

C. **CREDIT HOURS:** 1

D. **WRITING INTENSIVE COURSE:** NO

E. **COURSE LENGTH:** 15 weeks

F. **SEMESTER(S) OFFERED:** Fall

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**
   1, 3 hour lab per week

H. **CATALOGUE DESCRIPTION:** This course covers diagnostic, repair, and adjustment procedures used in suspension and steering systems. Proper use of suspension and steering tools and equipment is covered, including computerized alignment equipment.

I. **PRE-REQUISITES/CO-REQUISITES:**
   a. Pre-requisite(s): AUTO 101 and AUTO 111 or MSPT 101
   b. Co-requisite(s): AUTO 241

J. **GOALS (STUDENT LEARNING OUTCOMES):**
   By the end of this course, the student will:

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<th>Course Objective</th>
<th>Institutional SLO</th>
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   | Demonstrate safe shop work practices | SLO-2: Critical Thinking Skills  
SLO-3: Professional Competence |
   | Operate steering suspension tools and equipment safely | SLO-2: Critical Thinking Skills  
SLO-3: Professional Competence |
   | Use service information and diagnostic tools to diagnose/repair suspension, steering system | SLO-2: Critical Thinking Skills  
SLO-3: Professional Competence |
   | Demonstrate how to diagnose suspension, steering and tire problems accurately | SLO-2: Critical Thinking Skills  
SLO-3: Professional Competence |
   | Identify components of steering system | SLO-2: Critical Thinking Skills  
SLO-3: Professional Competence |
   | Identify components of suspension system | SLO-2: Critical Thinking Skills  
SLO-3: Professional Competence |

   SLO-1: Communications Skills  
SLO-2: Critical Thinking Skills  
SLO-3: Professional Competence  
SLO-4: Inter/Intrapersonal Skills

L. **REFERENCES:** Manufacturers Reference manuals, Mitchell manuals, All Data

M. **EQUIPMENT:** Students required automotive tool kit. All special tool provided by the lab.

N. **GRADING METHOD:** A-F

O. **MEASUREMENT CRITERIA/METHODS:** Laboratory job sheets, performance tests and attendance

P. **DETAILED TOPICAL OUTLINE:** see Auto 241

Q. **LABORATORY OUTLINE:**

**NATEF SUSPENSION**

1. **Front Suspensions**
   a. Diagnose short and long arm suspension system noises, body sway, and uneven riding height problems; determine needed repairs.
   b. Diagnose MacPherson strut suspension system noises, body sway, and uneven riding height problems; determine needed repairs.
   c. Inspect upper and lower control arms, bushings, shafts, and rebound bumpers. Replace if necessary.
   d. Inspect strut rods and bushings. Replace if necessary.
   e. Inspect upper and lower ball joints on short and long arm suspension systems
   f. Replace Ball Joint
   g. Inspect Steering Knuckle and Related Components
   h. Inspect a steering knuckle and related assemblies.
   i. Inspect short and long arm suspension system coil springs and spring insulators. Replace if necessary.
   j. Inspect and adjust suspension system torsion bars; inspect mounts.
   k. Inspect stabilizer bar bushings, brackets, and links.
   l. Replace stabilizer bar bushings and related hardware.
   m. Inspect ball joints on MacPherson strut suspension systems.
   n. Remove, inspect, and replace MacPherson strut cartridge or assembly, strut coil spring, and insulators.

2. **Rear Suspensions**
   a. Inspect coil springs and spring insulators.
   b. Inspect transverse links, control arms, bushings, and mounts.
   c. Inspect leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts.
   d. Remove, inspect and replace MacPherson strut cartridge of assembly, strut coil spring, and insulators (silencers).

3. **Related Service**
   a. Remove, inspect, and service or replace front or rear wheel bearings.
   b. Inspect and replace shock absorbers.
   c. Perform system tests of electronically-controlled suspension systems.

4. **Wheel Alignment Diagnosis, Adjustment and Repair**
   a. Diagnose vehicle handling concerns such as wandering, pulling, hard steering, and poor steering return problems; determine needed repairs.
   b. Measure vehicle riding height; determine needed repairs
   c. Check and adjust front wheel camber
   d. Check and adjust rear wheel camber
   e. Check and adjust caster
f. Check and adjust front wheel toe
g. Center steering wheel.
h. Check toe-out-on-turns using radius plates
i. Check SAI(steering axis inclination)/KPI (king pin inclination) and included angle
j. Check and adjust rear wheel toe
k. Check thrust angle.
l. Check for front wheel setback.
m. Check front cradle (subframe) alignment.

5. Wheel and Tire Diagnosis and Repair
   a. Diagnose unusual tire wear patterns.
   b. Inspect tires; check and adjust air pressure.
   c. Diagnose wheel and tire vibration problems
   d. Measure wheel, tire, axle, and hub runout
   e. Diagnose tire pull (lead) problem; determine corrective actions.
   f. Balance wheel and tire assembly.
   g. Dismount, inspect, repair, and remount tire on wheel.

STEERING
   1. Steering Systems Diagnosis and Repair
      a. Disable supplemental restraint systems (SRS) with manufacturers' procedures.
      b. Diagnose steering column noises, looseness, and binding problems (including tilt mechanisms); determine needed repairs.
      c. Diagnose power rack and pinion steering gear vibration, looseness, and hard steering problems; determine needed repairs.
      d. Inspect and replace steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel.
      e. Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets.
      f. Disassemble, inspect, repair, and assemble rack and pinion steering gear.
      g. Adjust manual or power steering gear.
      h. Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.
      i. Inspect power steering fluid levels and condition.
      j. Bleed power steering system.
      k. Inspect and diagnose power steering fluid leakage determine needed repairs.
      l. Inspect, adjust or replace and adjust power steering pump belt.
      m. Remove, inspect/ and replace power steering pump/ pump mounts/ pump seals/ and gaskets.
      n. Perform power steering system pressure testi determine needed repairs.
      o. Inspect and replace power steering hoses and fittings.
      p. Inspect and replace pitman arm/ relay (centerlink/intermediate) rod/ idler arm and mountings/ and steering linkage damper.
      q. Inspect/ replace, and adjust tie rod ends {sockets} / tie rod sleeves, and clamps.
      r. Diagnose, inspect, adjust, repair or replace components of electronically-controlled steering system