MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
AUTO 282 – SUSPENSION DESIGN AND SERVICE LABORATORY

Created by: Jeffery Stinson

Updated by: Brandon Baldwin

Canino School of Engineering Technology
Department: Automotive Technology Program

Semester/Year: Fall 2018
A. **TITLE**: Suspension Design and Service Laboratory

B. **COURSE NUMBER**: AUTO 282

C. **CREDIT HOURS**: (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)

   # Credit Hours: 1
   # Lecture Hours: per week
   # Lab Hours: 3 per week
   Other: per week

   Course Length: 15 Weeks

D. **WRITING INTENSIVE COURSE**: Yes ☒ No ☐

E. **GER CATEGORY**: None: ☐ Yes: GER !
   If course satisfies more than one: GER !

F. **SEMESTER(S) OFFERED**: Fall ☒ Spring ☐ Fall & Spring ☐

G. **COURSE 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.

H. **PRE-REQUISITES**: None ☐ Yes ☒ If yes, list below:

   AUTO 101 and AUTO 111 or MSPT 101

   **CO-REQUISITES**: None ☐ Yes ☒ If yes, list below:

   AUTO 241 Suspension Design and Service Lecture
I. **STUDENT LEARNING OUTCOMES:** *(see key below)*

By the end of this course, the student will be able to:

<table>
<thead>
<tr>
<th>Course Student Learning Outcome [SLO]</th>
<th>Program Student Learning Outcome [PSLO]</th>
<th>GER [If Applicable]</th>
<th>ISLO &amp; SUBSETS</th>
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</thead>
<tbody>
<tr>
<td>Demonstrate safe shop work practices</td>
<td>ALO4</td>
<td>N/A</td>
<td>2-Crit Think ISLO ISLO CA IA PS Subsets</td>
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<tr>
<td>Operate steering suspension tools and equipment safely</td>
<td>ALO1, ALO2</td>
<td>N/A</td>
<td>2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO CA IA PS Subsets</td>
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<td>Use service information and diagnostic tools to diagnose/repair suspension, steering system</td>
<td>ALO1, ALO2, ALO3</td>
<td>N/A</td>
<td>2-Crit Think 3-Found Skills 5-Ind, Prof, Disc, Know Skills CA IA PS IM</td>
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<tr>
<td>Demonstrate how to diagnose suspension, steering and tire problems accurately</td>
<td>ALO1, ALO2, ALO3</td>
<td>N/A</td>
<td>2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO CA IA PS Subsets</td>
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<tr>
<td>Identify components of suspension system</td>
<td>ALO1, ALO2</td>
<td>N/A</td>
<td>2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO CA IA PS Subsets</td>
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<tr>
<td>Identify components of steering system</td>
<td>ALO1, ALO2</td>
<td>N/A</td>
<td>2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO CA IA PS Subsets</td>
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<td>ISLO &amp; Subsets</td>
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<td>ISLO #</td>
<td>Communication Skills</td>
<td>Oral [O], Written [W]</td>
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<td>1</td>
<td>Critical Thinking</td>
<td>Critical Analysis [CA], Inquiry &amp; Analysis [IA], Problem Solving [PS]</td>
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<td>2</td>
<td>Foundational Skills</td>
<td>Information Management [IM], Quantitative Lit./Reasoning [QTR]</td>
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<td>3</td>
<td>Social Responsibility</td>
<td>Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]</td>
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<td>4</td>
<td>Industry, Professional, Discipline Specific Knowledge and Skills</td>
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*Include program objectives if applicable. Please consult with Program Coordinator!
J. **APPLIED LEARNING COMPONENT:** Yes ☑ No ☐

If YES, select one or more of the following categories:

- Classroom/Lab
- Internship
- Clinical Placement
- Practicum
- Service Learning
- Community Service
- Civic Engagement
- Creative Works/Senior Project
- Research
- Entrepreneurship
  (program, class, project)

K. **TEXTS:**

Erjavec, Jack. NATEF Standards Job Sheets Area A4, Delmar Cengage Learning

L. **REFERENCES:**

Manufacturers Reference Manuals, Mitchell Manuals, AllData, ShopKeyPro.

M. **EQUIPMENT:** None ☐ Needed: Students tool requirement. All special tools are provided by the lab.

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

O. **SUGGESTED MEASUREMENT CRITERIA/METHODS:**

Laboratory job sheets, performance tests and attendance.

P. **DETAILED COURSE OUTLINE:**

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. 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 steeringwheel.
   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

Q. LABORATORY OUTLINE: None ☒ Yes ☐
same