

**STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK**



MASTER SYLLABUS

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

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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:

<u>Course Student Learning Outcome</u> <u>[SLO]</u>	<u>Program Student Learning Outcome</u> <u>[PSLO]</u>	<u>GER</u> <i>[If Applicable]</i>	<u>ISLO & SUBSETS</u>	
Demonstrate safe shop work practices	ALO4	N/A	2-Crit Think ISLO ISLO	CA IA PS Subsets
Operate steering suspension tools and equipment safely	ALO1, ALO2	N/A	2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	CA IA PS Subsets
Use service information and diagnostic tools to diagnose/repair suspension, steering system	ALO1, ALO2, ALO3	N/A	2-Crit Think 3-Found Skills 5-Ind, Prof, Disc, Know Skills	CA IA PS IM
Demonstrate how to diagnose suspension, steering and tire problems accurately	ALO1, ALO2, ALO3	N/A	2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	CA IA PS Subsets
Identify components of suspension system	ALO1, ALO2	N/A	2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	CA IA PS Subsets
Identify components of steering system	ALO1, ALO2	N/A	2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	CA IA PS Subsets

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KEY	<u>Institutional Student Learning Outcomes [ISLO 1 – 5]</u>
ISLO #	ISLO & Subsets
1	Communication Skills Oral [O], Written [W]
2	Critical Thinking <i>Critical Analysis [CA] , Inquiry & Analysis [IA] , Problem Solving [PS]</i>
3	Foundational Skills <i>Information Management [IM], Quantitative Lit./Reasoning [QTR]</i>
4	Social Responsibility <i>Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]</i>
5	Industry, Professional, Discipline Specific Knowledge and Skills

*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:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Classroom/Lab | <input type="checkbox"/> Civic Engagement |
| <input type="checkbox"/> Internship | <input type="checkbox"/> Creative Works/Senior Project |
| <input type="checkbox"/> Clinical Placement | <input type="checkbox"/> Research |
| <input type="checkbox"/> Practicum | <input type="checkbox"/> Entrepreneurship |
| <input type="checkbox"/> Service Learning | (program, class, project) |
| <input type="checkbox"/> Community Service | |

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