AUTOMOTIVE STEERING/SUSPENSION (NATEF Compliant)
Course Syllabus

Course Number: ATOS-1611  OHLAP Credit: No
OCAS Code: None
Course Length: 95 Hours
Career Cluster: Transportation, Distribution & Logistics
Career Pathway: Automotive Service
Career Major(s): Automotive General Service Technician (NATEF Compliant)

Pre-requisite(s):

Course Description:
In this course the student will learn about the steering and suspension components and the inspection of for these components. The student will also cover shocks, struts and the mounting and balancing of tire and wheel assemblies.

This course includes steering system diagnosis and repair or replacement operations, including the power steering pump, tie rod ends, pitman arms, relay rods and steering dampeners. Also covered will be front and rear suspension systems diagnosis and repair, including inspecting and replacement of components. The student will also learn how to perform wheel alignments and how to diagnose wheel alignment issues. The student will learn to diagnose and repair steering columns, and how to disable and enable the Supplemental Restraint System (SRS). Also covered will be the power and manual steering racks and steering gears. This course will cover the electrically controlled steering systems and how to diagnose and repair these systems.

Textbooks:

Course Objectives: A. Complete Automotive Steering and Suspension Introduction
1. Discuss the need for the steering and suspension system.
2. Identify some of the present and future trends in suspension and steering systems.
3. Discuss tools and safety precautions used in Steering/Suspension.
4. Pass safety test with 100% accuracy.
5. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause and correction. ¹
6. Identify and interpret suspension and steering concern; determine necessary action. ¹
7. Research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins. ¹
8. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals). ¹

B. General: Suspension and Steering Systems
1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.  P-1

C. Steering Systems Diagnosis and Repair

1. Disable and enable supplemental restraint system (SRS).  P-1

2. Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).  P-1

3. Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action.  P-2

4. Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action.  P-2

5. Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action.  P-2

6. Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action.  P-2

7. Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.  P-2

8. Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots; replace as needed.  P-2

9. Determine proper power steering fluid type; inspect fluid level and condition.  P-1

10. Flush, fill, and bleed power steering system.  P-2

11. Inspect for power steering fluid leakage; determine necessary action.  P-1

12. Remove, inspect, replace, and adjust power steering pump drive belt.  P-1

13. Remove and reinstall power steering pump.  P-2

14. Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment.  P-2

15. Inspect and replace power steering hoses and fittings.  P-2

16. Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.  P-2

17. Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.  P-1

18. Identify hybrid vehicle power steering system electrical circuits and safety precautions.  P-2

19. Inspect electric power-assisted steering.  P-3
D. Suspension Systems Diagnosis and Repair

1. Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine necessary action. P-1
2. Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine necessary action. P-1
3. Inspect, remove and install upper and lower control arms, bushings, shafts, and rebound bumpers. P-3
4. Inspect, remove and install strut rods and bushings. P-3
5. Inspect, remove and install upper and/or lower ball joints (with or without wear indicators). P-2
6. Inspect, remove and install steering knuckle assemblies. P-3
7. Inspect, remove and install short and long arm suspension system coil springs and spring insulators. P-3
8. Inspect, remove and install torsion bars and mounts. P-3
9. Inspect, remove and install front stabilizer bar (sway bar) bushings, brackets, and links. P-3
10. Inspect, remove and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount. P-3
11. Inspect, remove and install track bar, strut rods/radius arms, and related mounts and bushings. P-3
12. Inspect rear suspension system leaf spring(s), bushings, center pins/bolts, and mounts. P-1

E. Related Suspension and Steering Service

1. Inspect, remove, and replace shock absorbers; inspect mounts and bushings. P-1
2. Remove, inspect, and service or replace front and rear wheel bearings. P-1
3. Describe the function of the power steering pressure switch. P-3

F. Wheel Alignment Diagnosis, Adjustment, and Repair

1. Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action. P-1
2. Perform pre-alignment inspection and measure vehicle ride height; perform necessary action. P-1
3. Prepare vehicle for wheel alignment on alignment machine; perform four-wheel alignment by checking and adjusting front and rear wheel caster, camber, and toe as required; center steering wheel. P-1
4. Check toe-out-on-turns (turning radius); determine necessary action. P-2
5. Check SAI (steering axis inclination) and included angle; determine necessary action. P-2
6. Check rear wheel thrust angle; determine necessary action. P-1
7. Check for front wheel setback; determine necessary action. P-2
8. Check front and/or rear cradle (sub-frame) alignment; determine necessary action. P-3
9. Reset steering angle sensor P-2

G. Wheels and Tires Diagnosis and Repair

1. Inspect tire condition; identify tire wear patterns; check for correct tire size and application (load and speed ratings) and adjust air pressure; determine necessary action. P-1
2. Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action. P-2
3. Rotate tires according to manufacturer’s recommendations. P-1
4. Measure wheel, tire, axle flange, and hub run-out; determine necessary action. P-2
5. Diagnose tire pull problems; determine necessary action. P-2
6. Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly (static and dynamic). P-1
7. Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor. P-2
8. Inspect tire and wheel assembly for air loss; perform necessary action. P-1
9. Repair tire using internal patch. P-1
10. Identify and test tire pressure monitoring system (indirect and direct) for operation; verify operation of instrument panel lamps. P-2
11. Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system. P-1

*ASE objective
All unmarked objectives are TTC instructor developed.
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Teaching Methods: The class will primarily be taught by the lecture and demonstration method and supported by various media materials to address various learning styles. There will be question and answer sessions over material covered in lecture and media presentations. Supervised lab time is provided for students to complete required projects.

Grading Procedures: 1. Students are graded on theory and shop practice and performance.
2. Each course must be passed with seventy (70%) percent or better.
3. Grading scale: A=90-100%, B=80-89%, C=70-79%, D=60-69%, F=50-59%.

Description of Classroom, Laboratories, and Equipment: Tulsa Technology Center campuses are owned and operated by Tulsa Technology Center School District No. 18. All programs provide students the opportunity to work with professionally certified instructors in modern, well-equipped facilities.

Available Certifications/College Credit: The student may be eligible to take state, national or industry exam after completion of the program. College credit may be issued from Oklahoma State University-Okmulgee or Tulsa Community College. See program counselor for additional information.

College Credit Eligibility: The student must maintain a grade point average of 2.0 or better.