

Automotive Suspension and Steering Course number-20123

There is a high demand for trained individuals in the automotive service field. The desire for the students to receive industry-based training at the basic level and step up to the higher level of competency in this field is the goal of this course. Completion of this course will aide students as they continue their education at the post-secondary level or in the workforce and in the preparation for their ASE certification.

Student Expectations

Students in this course will be provided detailed information on steering and suspension systems in a class room environment. They will also have the opportunity to complete hands-on exercises in a lab environment to demonstrate their abilities to identify steering and suspension problems and correct those problems. Students will be evaluated by traditional tests, hands-on evaluations and receive daily participation points. The students will have many different guest speakers and attend several field trips throughout the course. Students will be required to complete a summary or questionnaire related to each guest speaker or field trip.

Attendance

Attendance is very important in this class. If students are absent, they will not receive participation points for that day. If the absent is excused, students will be provided the opportunity to make-up the missed work, if requested in a timely manner. Tardiness also has a negative impact on the students, because they will miss the critical information about the daily activities. Students that are tardy will result in loss of participation point.

Cell Phones

Cell phones are NOT to be used in the classroom unless permission was granted by the instructor. Any use of cell phones during class, other than times allowed by the instructor, will result in a loss of participation points.

Food and Drink

Food and drinks, besides water, are NOT allowed in the classroom. Any food or drinks in the classroom will result in a loss of professional points.

Grading Scale

Semester Grading

93-100 A

1st Quarter 42.5%

85-92 B

2nd Quarter 42.5%

76-84 C

Semester Test 15%

65-75 D

0-64 F

Topics Covered:

- Automotive technology safety practices
- General suspension and steering
- Steering systems
- Suspension systems: front & rear suspension
- Suspension systems: miscellaneous service
- Wheel alignment
- Wheel and tire service
- Career exploration

#1: Demonstrate automotive technology safety practices including Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements for an automotive repair facility.

AS&S1.1 Demonstrate automotive technology safety practices.

- Use protective clothing and equipment according to OSHA and EPA requirements
- Summarize the proper use of MSDS (Material Safety Data Sheet)
- Demonstrate the proper use of hand and power tools
- Examine basic shop safety using OSHA (Occupational Safety Health Administration) standards
- Maintain a portfolio of successfully completed safety and equipment exams

2: Properly test, diagnose, service, and repair general suspension and steering systems

AS&S2.1 Understand general suspension and steering service.

- Complete work order which includes customer information, vehicle identification, customer concern, related service history, cause, and correction
- Identify and interpret suspension and steering concern; determine necessary action
- Research applicable vehicle and service information such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins
- Locate and interpret vehicle and major component identification numbers (VIN), vehicle certification labels, calibration decals

#3: Properly test, diagnose, service and repair steering systems

AS&S3.1 Diagnosis and determine necessary action to repair steering system.

- Inspect power steering fluid levels and condition
- Diagnose and inspect steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action
- Diagnose power steering fluid leakage; determine necessary action
- Diagnose power steering gear in both non-rack and pinion and rack and pinion; binding, uneven turning effort, looseness hard steering, and fluid leakage concerns; determine necessary action
- Test and diagnose components of electronically controlled steering systems using a scan tool; determine necessary action
- Inspect and test non-hydraulic electric-power assist steering
- Identify hybrid vehicle power steering system electrical currents, service, and safety precautions

AS&S3.2 Repair steering system

- Disable and enable supplemental restraint system (SRS)
- Remove and replace steering wheel; center/time supplemental restraint system coil (SRS clock spring) • Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets
- Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots
- Remove, inspect, replace, and adjust power steering pump belt
- Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps
- Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper
- Inspect and replace power steering hoses and fittings
- Adjust manual or power non-rack and pinion worm bearing preload and sector lash
- Remove and reinstall power steering pump
- Remove and reinstall power steering pump pulley; check pulley and belt alignment

#4: Properly test, diagnose, service, and repair front and rear suspension systems

AS&S4.1 Diagnosis and determine necessary action to repair front and rear suspension systems.

Examples:

- Diagnose suspension system noises, body sway, and uneven riding height concerns; determine necessary action

AS&S4.2 Repair front suspension systems.

- Remove, inspect and install upper and or lower ball joints
- Remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount
- Remove, inspect, and install strut rods (compression/tension) and bushings
- Remove, inspect, and install steering knuckle assemblies
- Remove, inspect, and install stabilizer bar bushings, brackets, and links
- Lubricate suspension and steering systems
- Remove, inspect, and install upper and lower control arms, bushing, shafts, and rebound bumpers
- Remove, inspect, and install short and long arm suspension system coil springs and spring insulators • Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts

AS&S4.3 Repair rear suspension systems.

- Remove, inspect, and install coil springs and spring insulators
- Remove, inspect, and install transverse links, control arms, bushings, and mounts
- Remove, inspect, and install strut cartridge or assembly, strut coil spring, and insulators (silencers)
- Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, bracket bushings, and mounts
- Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts

#5: Properly test, diagnose, service and repair suspension systems; miscellaneous service

AS&S5.1 Diagnosis and determine necessary action to repair suspension systems; miscellaneous service. • Test and diagnose components of electronically controlled suspension systems using a scan tool; determine necessary action

AS&S5.2 Repair miscellaneous service.

- Inspect, remove, and replace shock absorbers
- Remove, inspect, and service or replace front and rear wheel bearings

#6: Properly test, diagnose, service and repair wheel alignment

AS&S6.1 Diagnosis and determine necessary action to perform wheel alignment.

- Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action
- Perform pre-alignment inspection; perform necessary action
- Measure vehicle riding height; determine necessary action
- Measure toe-out-on-turns (turning radius); determine necessary action
- Check SAI (steering axis inclination) and included angle; determine necessary action⁵
- Diagnose front wheel setback; determine necessary action
- Check front cradle (sub-frame) alignment; determine necessary action

AS&S6.2 Perform calculation to make alignment repair.

- Measure and compare alignment angles to specifications and calculate correction
- Perform alignment repair Indicator

#7: Properly test, diagnose, service, and repair wheel and tire service

AS&S7.1 Diagnosis and determine necessary action to repair wheels and tires.

- Diagnose tire wear patterns; determine necessary action
- Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action
- Evaluate wheel, tire, axle, and hub runout; determine necessary action
- Diagnose tire pull (lead) problem; determine necessary action

- Inspect, diagnose, and calibrate tire pressure monitoring system

AS&S7.2 Repair wheels and tires.

- Rotate tires according to manufacturer's recommendations
- Balance wheel and tire assembly (static and dynamic)
- Reinstall wheel; torque lug nuts
- Inspect tire and wheel assembly for air loss; perform necessary action
- Dismount, inspect, repair and remount tire on wheel equipped with tire pressure sensor