STRANDS AND STANDARDS

ASE STEERING AND SUSPENSION

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Course Description

This course is a follow up course to the ASE Engine and Chassis MLR courses and is in a sequence that prepares individuals to apply technical knowledge and skills to the specialized maintenance and repair of automotive vehicles. Instruction covers training in the following areas: safety and steering and suspension. Work ethics and productivity are an integral part of the classroom and lab activities of these courses. This course is based on the ASE 2022 Task Lists which can be found at https://www.aseeducationfoundation.org/resources

Intended Grade Level	10 - 12
Units of Credit	0.5
Core Code	40-09-00-00-023
Concurrent Enrollment Core Code	40-09-00-13-023
Prerequisite	ASE ENGINE-MLR, ASE CHASSIS-MLR
Skill Certification Test Number	
Test Weight	
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Automotive
Endorsement 2	
Endorsement 3	

STRAND 1

Students will participate in personal and leadership development activities through SkillsUSA or another appropriate career and technical student organization.

Standard 1

Student will use communication skills to effectively communicate with others.

- Understand when it is appropriate to listen and to speak.
- Understand and follow verbal and written instructions for classroom and laboratory activities.

Standard 2

Student will effectively use teamwork to respectfully work with others.

- Identify and understand different roles in working with a team.

Standard 3

Student will use critical thinking and problem-solving skills.

- Analyze the cause of the problem.
- Develop a solution to address the problem.
- Implement the plan.
- Evaluate the effectiveness of the plan.

Standard 4

Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

- Set and meet goals on attendance and punctuality.
- Prioritize, plan, and manage work to complete assignments and projects on time.

Standard 5

Student will be accountable for results.

- Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
- File a regular written report on progress toward completion of assignments and projects.

Standard 6

Be familiar with the legal requirements and expectations of the course.

- Be familiar with the course disclosure statement and all requirements for successful completion of the course.
- Demonstrate workplace ethics, e.g. fair, honest, disciplined.

STRAND 2

Students will participate in work-place readiness activities.

Standard 1

Student will demonstrate employability skills.

- Use a career search network to find career choices.
- Write a resume including a list of demonstrated skills.
- Write a letter of application.
- Complete a job application.
- Participate in an actual or simulated job interview.

Standard 2

Student will participate in a work-based learning experience outside the classroom.

- Student will plan and implement a work-based learning experience aligned with their career goal.

STRAND 3

Students will understand and demonstrate general shop safety.

Standard 1

Learn safe working habits and procedures. Pass a safety test with 100 percent.

- Personal safety.
- Tool and equipment safety.
- Workplace safety.
- Personal protective equipment (PPE).

Standard 2

Comply with safety rules for working with automotive chemicals.

- Chemical manufacturers provide a Safety Data Sheets (SDS) for each chemical they produce.
- Identify the location of and navigate through the SDS for critical information.
- Store and dispose of chemicals in properly labeled containers.

Standard 3

Identify the gasses encountered in the automotive field and the hazards they present.

- Water, oxygen, nitrogen, carbon dioxide (CO2), hydrocarbons (HC), oxides of nitrogen (NOx), and carbon monoxide (CO).
- HC, NOx, and CO can pose health and environmental problems if they are not controlled.

Standard 4

Identify the hazards and control of asbestos dust.

- Asbestos is a carcinogen – a substance that causes cancer.
- Never use compressed air to clean brake assemblies.
- Understand approved methods such as a brake vacuum or brake washer machine.
- Because some exposure might be unavoidable, wear an approved filter mask.

Performance Skills

Understand general shop safety.

- Pass a safety test with 100 percent.
- Comply with safety rules for working with automotive chemicals.
- Identify the gasses encountered in the automotive field and the hazards they present.
- Identify the hazards and control of asbestos dust.

STRAND 4

Students will inspect the Steering and Suspension.

Standard 1

Research vehicle service information such as fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including vehicles equipped with advanced driver assistance systems (ADAS).

Standard 2

Identify suspension and steering system components and configurations.

Standard 3

Retrieve and record DTCs, OBD monitor status, and freeze frame data; clear codes and data when directed.

Standard 4

Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.

Standard 5

Identify and interpret suspension and steering system concerns; determine needed action.

Performance Skills

- Research applicable vehicle and service information.
- Identify suspension and steering system components and configurations.
- Retrieve and record DTCs, OBD monitor status, and freeze frame data.
- Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.
- Identify and interpret suspension and steering system concerns.

STRAND 5

Students will inspect the Steering Systems.

Standard 1

Inspect rack and pinion steering gear tie rod ends (sockets) and bellows boots; repair or replace as needed.

Standard 2

Inspect power steering fluid level and condition.

Standard 3

Drain and replace power steering system fluid; use proper fluid type per manufacturer specification.

Standard 4

Inspect for power steering fluid leakage; determine needed action.

Standard 5

Remove, inspect, replace, and/or adjust power steering pump drive belt.

Standard 6

Inspect, remove, and/or replace power steering hoses and fittings.

Standard 7

Inspect, remove, and/or replace pitman arm, relay (centerlink/intermediate) rod, idler arm, mountings, and steering linkage damper.

Standard 8

Inspect, replace, and/or adjust tie rod ends (sockets), tie rod sleeves, and clamps (non-rack and pinion).

Standard 9

Inspect and test electric power steering system; determine needed action.

Standard 10

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

Standard 11

Diagnose steering column noises, looseness, and binding concerns (including tilt/telescoping mechanisms); determine needed action.

Standard 12

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

Standard 13

Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine needed action.

Standard 14

Inspect steering shaft universal joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; determine needed action.

Standard 15

Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.

Standard 16

Remove and reinstall power steering pump.

Standard 17

Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment.

Performance Skills

- Inspect rack and pinion steering gear tie rod ends (sockets) and bellows boots.
- Inspect power steering fluid level and condition.
- Drain and replace power steering system fluid.
- Inspect for power steering fluid leakage.
- Remove, inspect, replace, and/or adjust power steering pump drive belt.
- Inspect, remove, and/or replace power steering hoses and fittings.
- Inspect, remove, and/or replace pitman arm, relay (centerlink/intermediate) rod, idler arm, mountings, and steering linkage damper.
- Inspect, replace, and/or adjust tie rod ends (sockets), tie rod sleeves, and clamps (non-rack and pinion).
- Inspect and test electric power steering system.
- Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).
- Diagnose steering column noises, looseness, and binding concerns (including tilt/telescoping mechanisms).
- Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns.
- Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns.
- Inspect steering shaft universal joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel.
- Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.

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

STRAND 6

Students will inspect the Suspension Systems.

Standard 1

Inspect, remove, and/or replace upper and/or lower control arms, bushings, and shafts.

Standard 2

Inspect and replace rebound/jounce bumpers.

Standard 3

Inspect, remove, and/or replace track bar, strut rods/radius arms, and related mounts and bushings.

Standard 4

Inspect, remove, and/or replace upper and/or lower ball joints (with or without wear indicators).

Standard 5

Inspect, remove, and/or replace suspension system coil springs and spring insulators.

Standard 6

Inspect, remove, and/or replace torsion bars and mounts.

Standard 7

Inspect, remove, and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links.

Standard 8

Inspect, remove, and/or replace strut assembly, strut coil spring, insulators, and upper strut bearing mount.

Standard 9

Inspect, remove, and/or replace components of suspension systems (Coil, Leaf, and Torsion).

Standard 10

Inspect, remove, and/or replace components of electronically controlled suspension systems.

Standard 11

Inspect, remove, and/or replace steering knuckle assemblies.

Standard 12

Inspect, remove, and/or replace steering knuckle assemblies.

Performance Skills

- Inspect, remove, and/or replace upper and/or lower control arms, bushings, and shafts.
- Inspect and replace rebound/jounce bumpers.
- Inspect, remove, and/or replace track bar, strut rods/radius arms, and related mounts and bushings.
- Inspect, remove, and/or replace upper and/or lower ball joints (with or without wear indicators).
- Inspect, remove, and/or replace suspension system coil springs and spring insulators.
- Inspect, remove, and/or replace torsion bars and mounts.
- Inspect, remove, and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links.

- Inspect, remove, and/or replace strut assembly, strut coil spring, insulators, and upper strut bearing mount.
- Inspect, remove, and/or replace components of suspension systems (Coil, Leaf, and Torsion).
- Inspect, remove, and/or replace components of electronically controlled suspension systems.
- Inspect, remove, and/or replace steering knuckle assemblies.
- Diagnose suspension system noises, body sway, and uneven ride height concerns.

STRAND 7

Students will inspect related Steering and Suspension Systems.

Standard 1

Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings.

Standard 2

Inspect, service, and/or replace front and rear wheel bearings.

Standard 3

Describe the function of electronically controlled suspension and steering systems and components, (i.e., active suspension and stability control).

Performance Skills

- Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings.
- Inspect, service, and/or replace front and rear wheel bearings.
- Describe the function of electronically controlled suspension and steering systems and components, (i.e., active suspension and stability control).

STRAND 8

Students will inspect Wheel Alignment System(s).

Standard 1

Perform pre-alignment inspection; measure vehicle ride height; determine needed action.

Standard 2

Describe four-wheel alignment angles (camber, caster, and toe) and effects on vehicle handling\tire wear.

Standard 3

Prepare vehicle for wheel alignment on alignment machine; perform four-wheel alignment by checking and adjusting front caster, front and rear camber, and toe as required; center steering wheel.

Standard 4

Check toe-out-on-turns (turning radius); determine needed action.

Standard 5

Check steering axis inclination (SAI) and included angle; determine needed action.

Standard 6

Check rear wheel thrust angle; determine needed action.

Standard 7

Check for front wheel setback; determine needed action.

Standard 8

Identify front and/or rear cradle (subframe) misalignment; determine needed action.

Standard 9

Reset steering angle sensor.

Standard 10

Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine needed action.

Performance Skills

- Perform pre-alignment inspection; measure vehicle ride height.
- Describe four-wheel alignment angles (camber, caster, and toe) and effects on vehicle handling\tire wear.
- Prepare vehicle for wheel alignment on alignment machine; perform four-wheel alignment by checking and adjusting front caster, front and rear camber, and toe as required; center steering wheel.
- Check toe-out-on-turns (turning radius).
- Check steering axis inclination (SAI) and included angle.
- Check rear wheel thrust angle.
- Check for front wheel setback.
- Identify front and/or rear cradle (subframe) misalignment.
- Reset steering angle sensor.
- Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns.

STRAND 9

Students will inspect Wheels and Tires.

Standard 1

Inspect tire condition/age; identify tire wear patterns; check for correct tire size, application (service-class, load, and speed ratings), and air pressure as listed on the tire information placard/label.

Standard 2

Rotate tires according to manufacturer’s recommendation including vehicles equipped with tire pressure monitoring system (TPMS).

Standard 3

Dismount, inspect, and remount tire on wheel (with/without TPMS); balance wheel and tire assembly.

Standard 4

Inspect tire and wheel assembly for air loss; determine needed action.

Standard 5

Repair tire following tire manufacturer approved procedure.

Standard 6

Identify indirect and direct tire pressure monitoring systems (TPMS); calibrate/relearn system; verify operation of instrument panel lamps.

Standard 7

Demonstrate knowledge of steps required to remove and replace sensors (per OEM/sensor manufacturer) in a tire pressure monitoring system (TPMS).

Standard 8

Perform Road Force balance/match mounting.

Standard 9

Diagnose wheel/tire vibration, shimmy, and noise; determine needed action.

Standard 10

Measure wheel, tire, axle flange, and hub runout; determine needed action.

Standard 11

Diagnose tire pull problems; determine needed action.

Performance Skills

- Inspect tire condition/age; identify tire wear patterns; check for correct tire size, application (service-class, load, and speed ratings), and air pressure as listed on the tire information placard/label.
- Rotate tires according to manufacturer's recommendation including vehicles equipped with tire pressure monitoring system (TPMS).
- Dismount, inspect, and remount tire on wheel (with/without TPMS); balance wheel and tire assembly.
- Inspect tire and wheel assembly for air loss.
- Repair tire following tire manufacturer approved procedure.
- Identify indirect and direct tire pressure monitoring systems (TPMS); calibrate/relearn system; verify operation of instrument panel lamps.
- Demonstrate knowledge of steps required to remove and replace sensors (per OEM/sensor manufacturer) in a tire pressure monitoring system (TPMS).
- Perform Road Force balance/match mounting.
- Diagnose wheel/tire vibration, shimmy, and noise.
- Measure wheel, tire, axle flange, and hub runout.
- Diagnose tire pull problems.